

# THE MONIST

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Editor: DR. PAUL CARUS.

Associates: { EDWARD C. HEGELER  
MARY CARUS.

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## THE THEORY OF EVOLUTION AND SOCIAL PROGRESS.<sup>1</sup>

THERE are two great ideas which, more than all others, have revolutionised modern scientific thought. These are (1) correlation and conservation of natural forces, and (2) *evolution*. The effect of the former has been felt mainly in the physical sciences, of the latter in the biological and sociological. We are concerned here only with the latter.

*Definition.* Evolution may be defined as continuous progressive change, according to certain laws and by means of resident forces, i. e., by natural forces residing in the thing evolving. As thus defined, it is one half of all science, and covers, therefore, nearly one half of the whole domain of modern thought. This may seem a startling assertion. I stop a moment to justify it.

Every system of interrelated parts may be studied from two points of view, and give rise to two departments of science, one of which, and the more complex one, is *evolution*. From the one point of view we study the action and reaction of the correlated parts among themselves only, producing equilibrium, stability, and permanent harmony. From the other point of view we perceive that the point of equilibrium itself is in motion, onward and upward, and we study the laws of this motion. We find that the equilibrium is never perfect, but is continually being disturbed infinitesimally, to be

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<sup>1</sup> An address delivered before the Midwinter Congress, Department of Economics and Politics, San Francisco, March, 1894.

again readjusted on a higher plane with more and more complex interrelations. The harmony is never complete, for infinitesimal discords are continually introduced, only to enhance the beauty and complexity of the ever-increasing harmony. It is this latter point of view that constitutes evolution.

Now, the whole cosmos and all its parts, even to the minutest detail, constitutes such an interrelated system. And since science is a study of the cosmos and its parts, all science has two aspects, one of which is evolution. For example :

1. The *animal body* is a complex system of admirably and delicately adjusted parts, each performing its own function, and by action and reaction co-operating with all others for the conservation of the life and happiness of the whole organism. The study of this constitutes the science of *physiology*. But in the growing animal the equilibrium is never perfect. On the contrary, it is continually being infinitesimally disturbed, only to be again readjusted on a higher plane with still more complex interrelations. The centre of equilibrium itself moves steadily onward and upward. The study of this onward and upward movement and of this steadily increasing complexity of interrelations is called *embryology*. It is not only evolution, it is the *type of evolution*.

2. The *solar system* is a wonderfully adjusted system of inter-related parts, which by their action and reaction produce an equilibrium, a stability and order so perfect that it has been likened to musical harmony. The study of this is physical astronomy or celestial *statics*. But the equilibrium and stability is not perfect and eternal. It is not so now, still less has it been so in the distant past. The present beautiful order and harmonious movement was not made out of hand at once, but has been gradually established and steadily increased from a primal condition of chaos to the extreme complexity and beauty of the present time. The study of this gradual increasing complexity has no separate name. It might be called celestial *dynamics*. It is cosmic development. It is *cosmic evolution*.

3. The *earth* may be studied as to its form and the forms of its parts, its seas and lands, mountains and valleys, rivers and lakes,

its currents of air and ocean, and the action and reaction of all these in producing present climates and other physical conditions which make it a fit habitation for man. All this is *physical geography*. Or we may study the earth and all its parts in their life-history; the gradual process of becoming what they are, the changes through which they have passed, the cause of these changes and their laws. This we call *physical geology*. It is *terrestrial evolution*.

4. The organic kingdom may be studied as to its present infinitely diversified forms; the distribution of these now on the surface of the earth, their relation to one another and to their present environment, the whole constituting by action and reaction through struggle for life a comparatively stable equilibrium. For this study we have yet no appropriate name, but it has been called *chorology*. Or we may study the continual change in all of these interrelated parts throughout all geological time; change by continued modification of each, and readjustment of all on a higher plane, with more complex interrelations. This is development of the organic kingdom throughout all geologic time. This is what most would call "*evolution par excellence*."

So much to make clear what we mean by evolution in the most comprehensive sense. Now the application.

5. *So society* may be studied as a complex system of interrelated parts, acting and reacting on one another by mutual dependence and mutual help; perfectly adjusted to produce eternal peace, prosperity, social order, and good government. This is *social statics*. Or we may study it in its onward movement and the laws of that movement. From this point of view we perceive that the equilibrium is never perfect; peace, contentment, and rest is never complete, nor ought to be; for society is ever struggling to reach a higher plane with wider outlook. The equilibrium is continually disturbed a little in order to be readjusted on a higher plane, with more complex interrelation of all its parts. This is *social dynamics*, *social development*, *social progress*. It is *social evolution*.

We see thus the universal scope of the theory of evolution. We see that its recent introduction has really doubled the domain of scientific thought. It has revolutionised our whole view of nature

and our philosophy on nearly all subjects. It has given an almost incredible impulse to all departments to which it has been applied, but especially to the more complex departments of *biology* and *sociology*.

But is the idea of evolution, then, so very recent? Yes, as a *scientific theory*, though not as a vague *philosophic idea*. It is very necessary to make this distinction. I will give, therefore, a very brief sketch of the history of the idea, in order to bring out this distinction.

#### PHILOSOPHIC IDEA.

Evolution as a vague philosophic idea may be traced back almost to the dawn of thought. It is dimly perceived in the sacred literature of the Hindus. It becomes a little more clear in early Greek philosophy, and still more clear in the philosophy of Lucretius, the Roman. After a mediæval sleep of many centuries it reappears still more clearly in the philosophic speculations of Swedenborg and Kant. I need not add that the speculations of John Wesley on this subject, of which there has been some talk recently, belong to the same category, i. e. philosophic speculation—not scientific theory.

Thus far we find evolution only in the form of philosophic speculation. That is, the evidence was derived from *within*, not from *without*. It was held because in accord with the laws and necessities of rational thought—not because in accord with observed facts of external nature. Now such mere philosophic ideas are ever unproductive of practical results. They are intended for the delectation of thinkers without even a thought of affecting practical life. These daughters of the intellect remain unmarried to *practice*, and therefore barren. They are vestal virgins about the sacred altar of truth forever without offspring.

#### SEMI-SCIENTIFIC THEORY.

The first attempt at a scientific theory was by Lamarck in 1809. But it was still only *semi-scientific*. It was still conceived in the philosophic rather than the scientific spirit. Its basis of observed facts was slender, and its conception of the causes and laws of evo-

lution very obscure. Therefore, when opposed by Cuvier, the greatest naturalist of that time, it succumbed. It was well so. It was a premature birth. It was not fit to live. It was not in harmony with the environment of the then known facts. As a scientific theory it was rejected and the question seemed closed.

It was again reopened for a brief space of time in 1844 by an anonymous book entitled *Vestiges of a Natural History of Creation*. This book was distinctly an appeal from the decision of the court of science to the higher court of popular intelligence. It was written in popular style with much specious but inconsequent reasoning and misconception of facts. It produced a profound impression on superficial thinkers, but was far less scientific than Lamarck's work. It was again opposed by all the best naturalists of the time, with Agassiz at their head, and was for the time crushed. I believe it was again best so. It was still a premature birth. The time was not yet ripe. It was not yet conceived in the true spirit of inductive science. The question again seemed closed.

#### TRUE SCIENTIFIC THEORY.

Again the scientific mind was awakened from its sense of security by the appearance in 1859 of Darwin's *Origin of Species*. This time, as we all know, the theory was almost immediately and universally accepted. The reason of this great difference in its reception now, was (1) that now for the first time it came in the form of a true *scientific theory*, based on an immense array of accurately observed facts and cautious reasonings. Darwin was a perfect type of a cautious, inductive reasoner. He had collected and observed facts and pondered on them; he had organised and systematised his thoughts and verified his conclusions, for twenty years in silence before he published. (2) Again, he not only proved organic evolution as a *fact*, but he showed *how* it could and did take place, by bringing forward a potent and intelligible factor, or cause of evolution, viz. *natural selection*. But again (3) and perhaps most important of all, now, for the first time, the scientific mind was fully prepared and waiting. The birth-time was fully come. The intellectual environment was favorable for its continued life.

Few persons, I think, fully appreciate the importance of this condition of the acceptance of truth. Nearly always the difficulty in the way of accepting new truth is the false or even inimical attitude of the mind. Once get the right, i. e. the rational standpoint, with obstacles or misconceptions removed, and truth at once seems almost self-evident. Now, ever since its birth, four hundred to five hundred years previously, science had been advancing, evolutionward. For centuries the scientific mind had been steadily approaching a standpoint from which evolution was a necessary condition of rational thought. The whole mission of science is to establish the universal reign of natural law. This reign of law had been already recognised in every realm of nature except the organic kingdom, and even there everywhere except in the matter of origin of new organic forms. The origin of species seemed the one anomaly in nature, the one exception to the universal reign of law, the one discord in the universal harmony, the one example of unreason in the rational constitution of the cosmos, and the one obstacle in the way of scientific advance. Darwin removed that obstacle out of the way and the triumph of law was complete. For centuries the conviction of universal reign of law had been gathering strength and like a rising tide pressing with ever increasing force against this obstacle. Darwin lifted the gate and the inrushing flood at once covered the whole realm of science.

Thus it has come to pass that now the difficulty is no longer in accepting, but in understanding how any reasonable mind can withhold assent. To those who look with naked eyes, from a rational point of view, the thing seems self-evident, axiomatic, a necessary condition of rational thought. For it is evidently naught else than the *law of causation* applied to forms instead of to phenomena. Let me explain what I mean.

Physical *phenomena* follow one another in unbroken succession, in continuous chain, each coming from a previous one, as its *cause* and giving rise to a subsequent one as its *effect*. This is the *law of causation*. We all accept this law; we act upon it every hour of our lives; we could not exist without its implicit acceptance. We therefore say it is a *necessary* law, a condition of rational thought. We

might, however, call it a *law of derivation* of phenomenon from phenomenon. So also forms—*organic forms*—follow one another in unbroken succession, in a continuous chain, each coming by natural generation from a previous one as its cause and giving rise to a subsequent one as its effect. We call this a *law of derivation*. We might call it a law of *causation*, and say, that *it* also is necessary—a condition of rational thought.

Again: physical phenomena often occur, the cause of which we do not know. In the continuous chain of causes we cannot find the *missing link*. But we never dream of doubting there *was* a link, that the phenomenon *had* a natural cause and came by a natural process. Because so to doubt, is to doubt the validity of human reason and the rational constitution of the universe. So also organic forms appear in the biological history of the earth, the preceding cause of which, the progenitors of which, we do not know. In the continuous chain of forms the missing link we cannot find. But we ought not on that account to doubt that there *was* a link, that the form *had* a natural cause and came by a natural process. Because again so to doubt, is to doubt the validity of human reason and the rational constitution of the universe.

I insist, then, that the derivative origin of all things, whether of phenomena or of forms, is certain, and its acceptance a necessary condition of rational thought; that the theory of evolution is naught else than the scientific, i. e. the rational mode of thinking about the origin of things. It is, therefore, certain and applicable to all nature and therefore to human society. If so, its application must give an incredible impulse to the science of sociology, as it has already done to the science of biology.

Now, it has been so applied especially by Spencer and his followers. Its application has indeed given immense impulse to the *study* of sociology; but as yet, we must confess, this increased study has had little effect in the way of *practical results* and especially in guiding social progress. The reason of this, I am convinced, is twofold. First, because of the extreme complexity and difficulty of the subject, and second, because unfortunately the impulse has taken a *wrong direction*. It is *this* wrong direction that I take up

first, because this is most fundamental. Once the right direction is taken and right methods used, and the difficulties arising from complexity of the subject-matter will slowly yield.

#### WRONG DIRECTION.

The wrong direction has been the immediate result of the dominance of a materialistic or mechanic philosophy and its application to every realm of nature. Under the guidance of this philosophy the tendency is to identify the social organism with the animal organism, the body politic with the animal body, and, therefore, to identify social progress with organic evolution. Our first endeavor therefore will be to show that there are many *kinds* of evolution under guidance of *different forces*, operating by *different laws* and on *different planes*. I touch these only sufficiently to show that there are such.

#### KINDS OR GRADES OF EVOLUTION.

These are:

1. *Physical evolution* of the *earth*, the planetary system, and of the cosmos. The science of geology treats of the evolution of the earth. The evolution of the planetary system and of the cosmos is yet little understood. The subject is still in the domain of more or less probable speculation. The *nebular hypothesis* is such a speculation.

2. *Chemical evolution*, i. e., the gradual evolution of matter from elementary or still simpler conditions, through compounds of various degrees of complexity to the most complex of all, viz., protoplasm. This is the domain of chemistry.

3. *Organic or biotic evolution*. This includes evolution of the individual and of the organic kingdom. It may be called evolution *par excellence*, since it is in this domain that investigation is most earnest and advance most rapid.

4. Last of all is *human evolution or social progress*.

Now I wish to show that there is a limit to each kind of evolution, beyond which it cannot go, and therefore that evolution continues only by being transferred to another plane and becoming another kind. For example:

1. In chemical evolution, matter by combination and recombination, and therefore by purely *chemical* forces, rose to higher and more complex forms, until it reached protoplasm, an almost inconceivably complex substance, known to be the physical basis of life. In this substance *chemical evolution reached its goal. Evolution could go no farther on that line.* During the inconceivable lapse of time since life began on the earth chemical evolution has never gone any farther. In achieving protoplasm and with it motility and sensibility, i. e. life, it achieved the possibility of another *kind* of evolution by another kind of force—*life*; operating on another and higher plane and by another process, viz., *organisation*. Therefore, evolution completed on the lower plane is transferred and continued on a higher plane as *organic evolution*.

2. In organic evolution we have another kind of evolution carried forward on a new plane under the guidance of a higher form of resident force—*life*—and by a wholly different process—*organisation*—with different laws and factors. *This form of evolution reached its goal and completion in man*, the highest possible animal. Evolution could go no farther on that plane. But in achieving man it achieved self-conscious reason and thereby the possibility of another kind of evolution on another and higher plane.

3. Therefore, organic evolution having reached its goal in man is immediately transferred to a higher plane and is thereby transformed and becomes *rational evolution* or *social progress*. This, I insist, is on a higher plane under the control of a different and higher force—*reason*, operating by different laws and factors, which we must seek to understand and to apply.

4. Is there still another and higher plane? The third plane just explained is all that immediately concerns us now. But shall we not carry out our line of thought, at least, as a suggestion? There must be a still higher and final plane, *the end and term of all evolution*. What else can it be but the *divine plane* from which all evolution sprang? Yes, the term and goal of human evolution is the ideal man, i. e., the divine man. Thus nature by evolution through infinite time struggled upwards to reach again the divine plane from which it originated. Can there be any more noble view, can there

be any other *worthy* view of the significance of nature and of evolution than this?

Now chemical evolution, although determined by *chemical* forces, yet is underlaid and conditioned by *physical* forces. Organic evolution, although urged onward by life forces, is underlaid and conditioned by physical and chemical forces, especially the latter. It is as if life-force used chemical forces and processes for its own higher purposes, to do the work of organisation. So, also, social progress is indeed determined and guided by reason, but is underlaid and conditioned by all lower forces and processes, especially by all the factors of organic evolution. It is again as if reason freely used all the factors of organic evolution for its own higher purpose of rational progress.

From what has been said it is at once seen that although there is a close relation between the social organism and the animal organism, the body politic and the animal body, and between organic evolution and social progress; although, as a result of this relation, all the doctrines and methods of biology must be carried over and used in sociology and all the factors of organic evolution in social progress; yet both in the social organism and in social progress there are higher forces at work. It is these higher forces which under the influence of a materialistic philosophy it has become the fashion to ignore. This vitiates all the reasonings of Comte, Spencer, and their followers. They have almost, if not quite, identified social progress with organic evolution. It becomes, therefore, a prime necessity to insist on the differences and even *contrasts* between them.

In order to do this I must at least enumerate the factors of organic evolution. These are (1) *pressure of a changing environment*, modifying function and therefore structure; and these modifications inherited and accumulated through successive generations indefinitely. (2) *Use and disuse of organs* modify their structure, and the change is inherited and accumulated through successive generations indefinitely. These two are the *Lamarckian factors*. (3) *Natural selection*, among divergently varying offspring, of those only which are fittest to survive. (4) *Sexual selection*, among contestant males,

of the strongest or most attractive, thereby increasing strength and beauty in successive generations. These two are the distinctive Darwinian factors, although Darwin admitted the other two also. (5) *Physiological selection*, or the segregation and sexual isolation, of the mutually fertile. This is the factor lately introduced by Romanes.

Now, no doubt, all these factors are carried over into human evolution or social progress, and are operative there; for man is also an animal. But there is another and higher factor introduced right here (for man is also more than an animal), a factor distinctive of social progress, a factor which soon becomes dominant over all others, viz. the *conscious voluntary co-operation of man himself in the work of his own evolution*. It is a conscious voluntary effort to attain a recognised ideal, in the individual and in society.

This new and higher factor was doubtless introduced in the beginning, i. e. at the moment of the origin of man by emergence of humanity out of animality. But at first it was very weak. Doubtless in early stages of his evolution, man, like other animals, was urged on by factors and forces of organic evolution, unknowing and uncaring whither he tended. But more and more as civilisation advanced the distinctively human factor became dominant until now, in the higher races and in the most highly civilised communities, it takes almost entire control of the process. This *free self-determined evolution*, in order to distinguish it from the *unconscious necessary evolution* characteristic of all else, is what we call *progress*. It is evident then, that as there is in man two natures, a rational and an animal, so there must be in society *two kinds of evolution*. The one is *organic evolution*, the other is *social progress*: This latter is only now beginning to be dominant. The former was a necessary preparation, not only in attaining humanity, but in carrying forward human evolution in its early stages until reason is strong enough to take control.

Now, it is evident that when this new and higher factor is introduced or even after it becomes dominant, the lower factors do not disappear, but only become subordinate. They still continue to underlie and condition the activity of the higher factor. This is

in accord with a general law of organic nature. In every system of correlated parts in harmonic relation by mutual dependence and mutual help, the higher stands above and dominates the lower, but the lower underlies and conditions the higher. So in social progress the higher, self-directing, distinctively human factor, takes control of the movement, but the lower organic factors underlie and condition its activity on every side.

Thus it happens that there is a close resemblance, yet an infinite difference, between human progress and organic evolution. The resemblance (arising, of course, from the operation of the organic factors) has been insisted on and even exaggerated into identity by many recent writers. It becomes the more necessary, therefore, to insist on and bring out in strong relief the differences and even contrasts produced by the introduction of the new factor, differences which are usually ignored, or slurred over, or at least minimised, because modern science seems to think that it must ignore the spiritual nature of man, on pain of being thought unscientific. See, then, some of these contrasts.

1. In organic evolution *nature* operates by *necessary* law without the conscious co-operation of the thing evolving. In social progress the spirit of man voluntarily co-operates with nature in the work of his own evolution, and even assumes to take the whole process mainly into its own hands. Now, this new, voluntary factor, consists essentially *in the formation and pursuit of ideals*—the voluntary striving after better things in the individual and in society. *We* indeed form ideals, but our ideals react and form *us*. Organic evolution is by *necessary* law, social progress is by *free* law, i. e. by a law freely followed. Organic evolution is by a *vis a tergo*, a *pushing* upward and forward from below and behind. Social progress, whether in the individual or in the race, is by a *vis a fronte*, a *drawing* upward and forward from above and in front by an aspiration, an attraction toward an ideal. Organic evolution is by a law of *force*; social progress by a law of *love*.

2. In organic evolution the *fittest* are those most in harmony with the physical environment, and therefore they survive. In social progress the *fittest* are those most *in harmony with the ideal*, i. e.

*the ethically best*, and often, especially in the early stages of development, when man is mainly under the dominion of the organic factors and the distinctive human factor is still feeble, they do not survive because not in harmony with the social environment. But while the *best individuals* may, indeed, perish, the ideal survives in the race and will eventually triumph.

3. Organic evolution strives only for survival of the fittest. Social progress strives to *make as many as possible fit to survive*. In organic evolution the weak, the sick, the helpless, the old, the unfit in any way, perish and ought to perish, because this is the only means of strengthening the *blood* or *physical nature* of the species. In social progress, on the contrary, the weak, the sick, the helpless, the old, the unfit in any way, are sustained and ought to be sustained, because sympathy, pity, love, strengthens the spirit, the moral nature of man, the distinctive human nature. In a word, in organic evolution war is the great element of advance; in rational evolution, peace. But we must remember that in this material world of ours, and during this, our earthly life, the moral nature is conditioned by the physical nature, the distinctive human by the animal. Therefore, in all our attempts to help the weak, we must beware lest we perpetuate weakness by inheritance. This gravest of social problems, viz. how shall we obey the higher, spiritual law of love and mutual help, without weakening the blood of the race by inheritance, and the spirit of the race by removing the necessity of self-help—this problem I believe can and will be solved, by a rational education, physical, mental, and moral. But, I forbear; this is too large a subject to be followed up now.

4. In organic evolution the bodily form and structure must continually change in order to keep in harmony with the ever-changing environment. In other words, organic evolution is by continual change of species, genera, families, etc. There must be a continual succession of new forms, by modification of old forms. In social progress, on the contrary,—and more and more as civilisation advances,—*man* modifies the *environment* so as to bring *it* in harmony with himself and his wants, and, therefore, there is no longer necessity for change of bodily form and structure or the making of new

species of man. Social progress is not by modification of *form*, i. e. new species; but by modification of *spirit*, i. e. new planes of activity, higher *character*. And the spirit is modified, not by the pressure of an *external* physical *environment*, but by the attractive force of an *internal* spiritual *ideal*; not by antagonistic struggle, but by generous co-operative emulation in the pursuit of the highest.

5. The way of evolution toward the highest, i. e. from protozoön to man, and from lowest man to the ideal man, is a very "strait and narrow way and few there be that find it." In the case of organic evolution, it is so strait and so narrow that any divergence therefrom is fatal to upward movement of the diverging form toward the goal man. No living form of animal is to-day on its way manward, or can by any possibility develop into man. "They are all gone out of the way." "There is none going right, no, not one." The organic kingdom developing through all geological time may be likened to a tree whose trunk is deeply buried in the lowest strata, whose great limbs were separated in early geologic times, whose secondary branches diverged in middle geologic times, and whose extreme twiglets, but also its graceful foliage, its beautiful flowers and luscious fruits, are the faunas and floras of the present day. But this tree of evolution is an excurrent stem, continuous through its clustering branches, straight to its terminal shoot—man. Once leave this stem as a branch, and it is easy enough to continue growing in the direction chosen, but *impossible* to get back on to the straight, upward way to the highest. Thus is it in organic evolution. But in distinctive human evolution or social progress, while the same law holds, it does so with a difference. If individual, or race, or society gets off the strait and narrow way to the highest, the divine ideal, it is hard, very hard, to get back. *Hard*, I say, but *not* impossible, because man's voluntary effort is the chief factor in his own evolution. By virtue of self-activity, through the use of reason, and by his co-operation in the work of his own evolution, man alone of all created things is able to rectify an error of direction and return again to the deserted way.

Thus far we have treated this voluntary co-operation in the work of evolution as only a *factor* co-ordinate with other factors, al-

though now becoming dominant. But really it is much more than a factor. It lifts evolution to a new and higher plane. As already shown, we have here a new kind of evolution, an evolution on another plane, and, as it were, in a different world—the spiritual. As *external physical* nature uses many factors to carry forward organic evolution; so the *internal spiritual* nature characteristic of man alone, uses these same factors on a higher plane and in a new way to carry forward human evolution or social progress.

As this is a fundamental point, I stop to illustrate and enforce. The proposition is that the reason of man consciously and voluntarily uses all the factors of organic evolution in a new way, and indeed transforms them for its own higher purposes. Thus, for example, one organic factor, the *environment*, is not allowed to work naturally, but is modified, or even totally changed, so as to affect suitably the human organism. This is the science of hygiene. Again, *use and disuse*, another factor of organic evolution, is similarly transformed by reason. The various organs of the body and faculties of the mind are deliberately used in such wise and degree as to produce the greatest efficiency of each part and the greatest strength and beauty of the whole. This is what we call *education*, physical, mental, and moral. So also the selective factors are similarly transformed, and *natural* selection becomes *rational* selection. We all know how successfully this method is applied for the improvement of domestic animals and cultivated plants; why should it not be applied also to the improvement of the race by selection of our mates in marriage; and to the improvement of society by the selection of our rulers, our law-makers, and our teachers? Alas! how little even yet does reason control our selection in these things. How largely are we yet under the control of the law of organic evolution.

But in these latter days some evolutionists (but not Darwin) say that natural selection is the only efficient factor in any kind of evolution, that Lamarckian factors are no factors of evolution, that changes in the organism in the course of the individual life, whether for better or for worse, are not inherited at all, and therefore such improvements in the individuals cannot be carried forward by in-

heritance and accumulated as race-improvement. Now I cannot at all accept this view. I will not stop to argue it, but simply point out some logical consequences when applied to human progress; consequences which, it seems to me, are nothing less than a *reductio ad absurdum* for the view.

All enlightened schemes of physical culture and hygiene, although directed primarily to secure the strength, and health, and happiness of the *present generation*, yet are sustained and ennobled by the conviction that the improvement of the individuals of each generation enter by inheritance into the gradual improvement of the race. All our schemes of education, intellectual and moral, though certainly intended mainly for the improvement of the individuals, are glorified by the hope that the race also is thereby elevated. It is true that these hopes are usually extravagant. It is true that the *whole* of the improvement of one generation is *not* carried over by inheritance to the next. It is true, therefore, that we cannot by education elevate a lower race up to the plane of a higher race in a few generations, or even perhaps in a few centuries. But there *is*, there *must be*, at least a small residuum, be it ever so small, carried forward from each generation to the next, which accumulating from age to age determines the slow evolution of the race. Are all these hopes then vain? They are so, if so-called acquired characters are not inherited. If these evolutionists are right, then character and capacity in each generation starts on the same plane as the last, to do its *own* work, without hope of giving any results to the next—only an eternal tread-mill round. Knowledge may indeed be accumulated in books, but the capacity to acquire it does *not* increase.

So, then, according to this modern view, we are left wholly to selection for our hopes of race-improvement. But selection cannot be applied by man in social progress in the same way as nature applies it in organic evolution, or as man himself applies it in improvement of domestic animals and in cultivated plants, for his higher nature forbids. For see: If it be true that reason must direct the course of human progress, and if selection of the fittest is the only method which can be used by reason in the work of race-improvement, i. e., if we cannot *make* the fit, but can only *select* the fit already

made to hand by nature, then the pitiless destruction of the weak, the sick, the helpless, the old, must, with Spartan firmness, be voluntarily and deliberately carried out with man, as with plants and animals. Against such a course we instinctively revolt with horror, because in flagrant violation of our spiritual nature.

But the free use by reason of the Lamarckian factors as already shown, is not followed by any such revolting consequences. All our hopes of race-improvement, therefore, are strictly conditioned on the efficacy of these factors, i. e., on the fact that useful changes in the individuals of each generation effected by a rational hygiene and a rational education are to some extent inherited and accumulated in the race.

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Thus far I have tried to show that investigation has taken a wrong direction. This error of direction was almost inevitable. It was the natural revulsion from a previous error in an opposite direction. Until the discovery, thirty or forty years ago, of the correlation of natural forces and the evolution of organic forms—until the derivative origin of man's body became certain, and of man's spirit became probable, it was imagined that man, especially in his higher parts, must be studied wholly apart from nature; that no light could be thrown on laws of social structure by the study of the animal body, or on social progress by the study of organic evolution. When, therefore, the close relation of man to animals, even in his highest parts, was established, the force of revulsion from previous error immediately carried the scientific mind to the opposite extreme, viz., that of identification of the laws of social structure with those of the animal body, and of social progress with those of organic evolution. It is this opposite error, prevalent even now, that I have attempted thus far to rectify.

But the error of direction being rectified, there still remains the enormous, almost hopeless, difficulties in the way of scientific treatment of the subject. The problem now is, How shall we use scientific method in the improvement of the social organism and in the guidance of social progress? I wish to show some of these difficul-

ties. For this purpose I find it best to present the subject from a somewhat different point of view.

The social organism, in so far as it is *not* the mere passive result of organic evolution by necessary law, may be regarded as a *work of art*. Now *art* is the material embodiment of certain underlying rational principles. Science is the formal statement and discussion of these same principles. Thus art (I speak mainly of useful art) may be regarded as the embodiment or application of science. Therefore, many imagine that science is the mother of art, and, therefore, must precede art. But not so. Science is rather the offspring of art. In nearly all cases art precedes science and is its condition. Levers and pulleys and inclined planes were used before the mechanical principles involved were understood. The arts of pottery, of agriculture, and of healing were practised long before the corresponding sciences existed. Art, then, leads to science, not science to art; but when science is sufficiently advanced she turns again and perfects art. But there is a transition stage, when an imperfect but arrogant science may interfere with the truer results of empiricism and do infinite harm. This is especially true in the more complex departments. In this stage science ought to be strictly subordinate to a wise empiricism. She must whisper suggestions, rather than utter commands. Such is the relation of science to art in agriculture and in medicine to-day. To illustrate: Science is the *daughter* of art,—heavenly daughter of an earthly mother,—but when she is sufficiently grown, she turns again like a good daughter and helps her mother, and even takes control of the household work. But let her beware lest in her childish vanity her unskilful and meddlesome hands do harm instead of good.

Thus, then, there are two kinds of art—empirical art and scientific or rational art. Empirical art precedes science and is its condition; rational art comes after science and is its embodiment. Empirical art is the outcome of the use of the *intuitive* reason, which works without fully understanding itself, and which in its highest forms we call genius. Scientific art is the outcome of the use of the *formal* reason, which analyses and understands the principles on which it works. Empirical art may indeed attain great perfection,

but sooner or later it reaches its limit and either petrifies or decays. Scientific art, because it understands itself, is of necessity indefinitely progressive. All art passes through these two stages, but more slowly in proportion as the principles involved are more complex. Many arts are still in the empirical stage.

Now, the highest, the most complex and difficult of all arts is the art of government, of politics, of social organisation. This art, of course, must have preceded the science of sociology, for it is the necessary condition not only of the science of sociology, but of civilisation itself. This art has thus far perfected itself, wholly by empirical methods. But there is one peculiarity about this art which makes advance by empirical methods irregular and doubtful. In all other arts the material is *foreign* to the artist; in this, artist and material are identified; society *makes* itself. In this regard it is a product of evolution, not a manufactured article. But again, as already shown, this evolution differs from all others in this: all other evolution is by *necessary* law, without the co-operation of the thing evolving; social evolution is mainly determined by the co-operating will of society itself. Thus it is a product both of art and of evolution. If it were the result of pure evolution by *necessary* law, it would be quiet and peaceful; if it were the result of pure art exercised on *passive, plastic, foreign* material, it would equally be peaceful. But the mingling of these two elements in varying proportions produces eternal conflict. In early stages the conflict is between classes or factions, and is violent; in later stages it is between parties and far less violent. But in all cases it is more or less blind, unreasoning, passionate conflict. But social evolution and the art of government have now reached a point beyond which they cannot go by the use of empirical methods alone. There really seems, in this country at least, to be serious danger of retrogression in politics and in social organisation unless *scientific methods* are introduced, i. e. unless we understand better the scientific principles of sociology and try to apply them to the art of government. But, on the other hand, it is evident from what has already been said, that the application must be made with the greatest caution and modesty, and in strict subordination to a wise empiricism. Science

must be introduced into politics only as suggesting, counselling, modifying, not yet as controlling and directing. Hitherto social art has advanced in a blind, blundering, staggering way, feeling its way in the dark, retrieving its errors, recovering its falls. But now, under the light of science, even though it be yet but dim, it ought to commence to advance more steadily, *seeing* as well as feeling its way.

Such are some of the principles of social progress as viewed from the standpoint of the theory of evolution and some of the difficulties in the way of the application of scientific method in this field. *My* part is to state principles. I leave it to statesmen to apply them.

JOSEPH LE CONTE.

UNIVERSITY OF CALIFORNIA.

## MATERIALISM UNTENABLE.

SO LONG as mind and body were considered as two distinct entities which could be dissociated, and having no necessary relation to each other, each could be thought of apart from the other and each was the subject of scientific effort leading to so-called mental science on the one hand and to physical science on the other. Matter was a temporary habitat for mind.

Most of those who dealt with philosophy believed that the science of mind was so much higher in dignity and worth than physical science, that their terminology degraded the latter. Matter was called gross, inanimate, inert. Forces were supposed to be the cause of any physical phenomena. Thus light, heat, electricity, chemical affinity, and vital force were installed as agencies for moving matter thus and thus. Forces enabled matter to act upon other matter at a distance to produce such phenomena as gravitation, magnetism, and so on. Caloric was invented to explain heat-phenomena. It was an imponderable something which matter could absorb and emit. There were several imponderables, all invented to help out the assumption that matter was inert and had no ability in itself to do anything. Whether or not it was the dominating influence of the reigning theology of the time which was accepted by physical philosophers, it is true that the latter with few exceptions accepted it and let go with reluctance every one of these genii which had been summoned to do physical work. After it had been shown by Davy and Count Rumford in the first of this century that heat was a vibratory motion of matter, the fact did not get into text-books on physics for two generations. Once clearly perceived, however, and in that one particular of heat one imponderable was banished

and every atom of matter having any temperature at all was endowed with energy, and was able to do something itself. So far it was able with its endowment of energy to act on other matter. But the heat of a mass of matter showed itself in two ways. First, by imparting it to other bodies when they were in contact with the heated body, that is, by what is called conduction, and second, imparting it to other bodies at a distance without contact and apparently irrespective of distance, by a process called radiation. If the body was heated so it would shine, that is, give out light, the latter was found to exhibit interference phenomena of such a peculiar sort as to necessitate the assumption of wave motion in some medium. It was observed, too, that the velocity of the light was nearly two hundred thousand miles in a second.

When Thomas Young worked out the theory of light as a wave-motion in interstellar ether, he met ridicule and contempt in some quarters and was elsewhere ignored. Years after Foucault's crucial experiment proving that light went slower through water than through air or a vacuum the text-books continued to say "There are two theories of light, the corpuscular and the undulatory."

The phenomena necessitated the assumption of a medium filling space and it was called the luminiferous ether to indicate its function as a conductor of light. The study of spectra and photography led some to the conclusion that there were three different kinds of radiations, which they called heat, light, and actinic or chemical rays, as they were supposed to be capable of producing, heating, lighting, and chemical effects respectively. Further researches proved that the only difference there was between these was one of wave-length, that every wave of every length was capable of heating bodies, that photography was possible with waves of all lengths and lastly that what was called light depended altogether upon the structure of the eye, or, in other words, is a physiological effect and not dependent in any way upon a particular kind of wave. This knowledge has profoundly affected theoretical views about many things. It has banished radiant heat, and light, and actinism as forces, and it has banished them as proper terminology for any physical phenomena. So completely is this so that Pro-

fessor Newcomb has proposed to banish the word light from physical science. There is no such thing, it is but a physiological effect and has no existence at all apart from eyes. The vibratory motions of atoms and molecules of matter which are called heat, set up disturbances in the medium called the ether, and the latter propagates the disturbance as waves with the velocity of one hundred and eighty-six thousand miles in a second. If the vibrations be slow the waves will be long. If they be more rapid the waves will be shorter. What either long or short waves will do depends altogether upon what kind and condition of matter they fall upon. They all originate in matter which is endowed with vibratory energy and in this process the energy is transformed from vibratory in matter to undulatory in the ether. The energy as such is in a new medium and is endowed with new properties.

In like manner electrical phenomena were thought to be indications of a different force of a dual character known as positive and negative. It was attributed to fluids of an imponderable sort that matter could absorb and emit under certain conditions. Since Maxwell's time it has been made evident that electrical phenomena, like heat phenomena, are interactions between common matter and the ether, for waves may be set up in the ether by electrical disturbances in matter, and the waves travel in the ether with the same velocity as those disturbances set up by heat-vibrations.

For this reason light has been called an electro-magnetic phenomenon, for electric waves in the ether have all the characteristics of ordinary waves which can affect the eyes. They can be refracted, reflected, and polarised. Just as any ray of so-called light can be traced back to a vibrating atom or molecule of matter, so may every so-called electric wave be traced back to movements in a mass of matter.

The dual character of the phenomena is apparently due to torsional strain in the ether which may be either right-handed or left-handed. No one now thinks that a fluid of any kind or a force of any kind is needed to account for electrical phenomena.

Magnetism, too, has been traced to molecules. When a current of electricity is made to traverse a coil of wire that surrounds a

piece of iron, the latter becomes a magnet and will attract other pieces of iron. It appears as if it was endowed with a quality it did not possess before the current of electricity went through the coil. As a matter of fact the function of the current is simply to arrange the molecules, not to magnetise them; they are no more magnetic with the current than without it, but when the molecules face all one way their individual magnetic qualities or fields, as they are called, conspire together, act in one direction, and if they be fixed in their positions, the mass becomes what is called a permanent magnet, whereas, when the current is stopped, if the molecules be free to assume new positions, the cohesion pressure twists them out of place, and then their fields neutralise each other by overlapping. The point here is that one has no need to assume any force or fluid outside of matter to account for magnetism, and that an electric current does not endow iron with its magnetic quality; it is inalienable, and the strength of magnetic attraction is the measure of ether pressure.

Chemical affinity has been shown by Dewar and Pictet to be dependent upon temperature absolutely. At low temperatures there is no indication of its existence, so in the absence of heat there is no such thing as chemical activity. As a force that has gone along with the rest.

As to force itself, irrespective of any particular manifestation, its existence has been denied by high authorities. The ninth edition of the *Britannica* has not recognised the necessity for giving it any attention. The word "pressure" may be substituted for it in almost every place where it is used, and that word carries with it no suggestion or implication of some extra-material condition that controls phenomena.

Vital force was dismissed a long time ago, and all biological phenomena are believed to have physical and chemical antecedents only.

Having discharged all forces and fluids and imponderables from service there still remain all the phenomena, but matter has to be credited with qualities it was believed not to possess, and instead of being the inert thing it was assumed to be, it turns out that it is

loaded with energy and capable of doing many things. Every atom has a hold upon every other atom in the universe, and a change in its position or form or aspect changes in some degree the position, form, or aspect of every other one. The change in position we attribute to gravitation, the change in form to heat, and in aspect to electromagnetism.

When we say that a pound of coal has 14,000 heat-units, we mean that when it combines with oxygen to form carbonic acid gas it gives up heat-energy enough to heat seven tons of water one degree, and as each heat-unit is the equivalent of 778 foot pounds, the working energy of the pound of coal is equal to the product of  $778 \times 14,000 = 10,892,000$  foot pounds. That means that the pound of coal and the oxygen have energy enough to raise the pound of coal two thousand miles high, and a mass of matter that can do so much, can hardly be called inert, no matter how helpless it looks. Charcoal is safe to handle, so is sulphur and saltpetre; mix them together, one has added no energy to them, but gunpowder is not a thing to be trifled with, because it has energy. The molecules are loaded with it, and they are in unstable equilibrium. Bread and butter may be fed to an engine as well as coal or wood; it is not so efficient as coal pound for pound, and it costs more, but it will serve the same purpose and in the same way, because it is loaded with energy in such shape as to be available for transformation into heat, and this is one of its functions when it is used for food. The science called thermo-chemistry is concerned altogether with the exchanges of energy in the various chemical transformations, and, as before stated, energy is the ability to move matter directly or indirectly. When it produces pressure simply, it is called potential energy; when it produces motion, it is called kinetic energy, but philosophers are persuaded that energy is always kinetic, even when no work is apparently done. This means that the atoms of matter are not passive bodies, but possess energy in other forms than are manifested by temperature and pressures of various sorts, so matter cannot be what it has for so long time been supposed to be, but must be credited with energies and possibilities which the older philosophies denied it to have.

The so-called properties of matter have often been considered as fiat endowments, but many of them, such as hardness, malleability, density, and the like are seen to be qualities of relation. Thus hardness refers to the degree of cohesion that exists between molecules, and the quality of hardness could not be affirmed of an atom. In like manner density means the degree of compactness of molecules. On the other hand, gravity, mass, and elasticity seem to be inherent in every atom and cannot be annihilated by destroying relations. No physical process has been discovered by which an atom can be annihilated or created, and it is commonly thought the atoms of matter are permanent structures with definite dimensions, somewhere in the neighborhood of the one-fifty-millionth of an inch in diameter.

The chemist reckons about seventy different kinds of matter called the elements, each one differing permanently in its inherent qualities from the rest, so it may be identified by its phenomena. Such differences as these different elements exhibit can hardly be imagined to be due to differences in size or shape. One might understand how spheres and cubes and octahedra and other forms could be made of wood, or stone, or brass, and they might be of any size, but the specific density of them all would be the same, and it would not take long to find it out. To assume that the different kinds of atoms were made of as many different kinds of stuff would not help philosophy or science any, and there is no probability in such a supposition. When one feels assured of the existence of the ether and is aware what reaction there is between atomic matter and it, he cannot doubt there must be some intimate relation between them, for the exchange of some kinds of energy is easy while other kinds appear to be unexchangeable. Thus there is no evidence that the translatory motion of a mass of matter affects the ether in the slightest degree, or that matter suffers from friction to any appreciable extent, even where a body like a comet moves through it at the rate of four hundred miles a second. The vibratory change of form sets up waves and the energy is absorbed by the ether at once. The ether is said to be frictionless on account of the former fact that translatory motion may be effected without loss of velocity.

That atoms are elastic there is abundant evidence from the spectrum of the elements, for when it is in the gaseous state and has time for vibrations between impacts, each element gives out waves of definite length, indicating definite rates of vibration, the very best evidence of elasticity known. But elasticity phenomena can be duplicated in the easiest manner by the gyroscope and similar machines, which when quiescent present no such quality, but when made to spin show a degree of elasticity in a manner proportionate to the speed of rotation, so if one could for the time assume that an atom was a spinning somewhat he would be able to see in a mechanical way the explanation of its elasticity, and if there were differences of degree in this he would infer there were different rates of rotation.

All have heard of the vortex ring theory of matter. Not every one knows that up to this time it may fairly be said that it is the only theory of matter we have which has any degree of probability at all. The evidences for it are steadily increasing and thus far nothing has appeared to shake confidence in it. This theory assumes that the atoms of matter are vortex rings of ether in the ether. They are permanent structures because they are in a frictionless medium. They possess form, elasticity, polarity, ability to react upon the ether about them, and on the other hand to be acted on by it. They are the embodiment of energy; indeed, abstract their energy and there would no longer be a ring, only free ether with no qualities different from the rest. This view makes an atom a form of energy, a very different thing from an inert thing, indeed the very opposite, and what might be expected of it would depend upon how much ether was in a state of rotation, its rate of rotation and the specific qualities of the ether of which it was composed, all of these are yet unknown, so one cannot deduce atomic phenomena from a knowledge of the ether. Of the latter it is common to speak of it as a continuous or space-filling medium, frictionless, non-molecular, or not made up of discrete parts, homogeneous, or alike in all directions, capable of acting like both a solid and a fluid, of being thrown into a stress, of transmitting vibratory energy at the rate of one hundred and eighty-six thousand miles a second and gravitative energy more than a million times that speed and withal not capable in any

way of affecting any of our senses in a direct way. Some have considered it as possessing elasticity and density, yet it is apparent that such elasticity and density cannot be like those properties as we find them in matter, for if density means compactness of molecules it cannot properly be applied to a substance not made of molecules, and if elasticity means ability to recover form after distortion it cannot be applied to something which has neither form nor the possibility of distortion.

It is common for such as have not paid much attention to physical distinctions to speak of the ether as matter, the assumption being that in some way not pointed out it is finer grained than what we call the elements. This will not do. There is no evidence that the ether has any grainedness at all, neither is there any evidence that it possesses one of the fundamental qualities of the elements, namely gravitation. Experience has led to the statement of the law of gravitation, the first part of which is that every particle of matter in the universe attracts every other particle. If there be evidence of the existence of something else in the universe not subject to such attraction it is evidently improper to call it matter, else the statement should read, *some* particles of matter in the universe, etc. Until there be some evidence of a physical sort as exists in abundance for what we call the elements that the ether possesses gravitative property it cannot be allowed to treat of it and make deductions from the assumption for the sake of any philosophical system.

How different the two are in their constitution and properties is well contrasted by Prof. Karl Pearson in his *Grammar of Science*, page 310, where he remarks, "our sense-impressions of hardness, weight, color, temperature, cohesion, and chemical constitution, may all be described by aid of the motions of a single medium, which itself is conceived to have no hardness, weight, color, temperature, nor indeed elasticity of the ordinary perceptual type." When these characteristics have been emptied out from matter whatever be left the residue is not matter of our experience and ought to be called by another name.

Physical knowledge is doubtless far from complete but it has been pursued far enough to make it clear that matter and ether are

two radically different substances, and more ; if there be any approach to truth in the proposition that the elements of ordinary matter are forms of vortical motion of ether in the ether, then it follows that the ether existed prior to the elements, for the latter are made of the former. If the ether be the frictionless medium it is assumed to be, then no physical process with which we are acquainted could possibly be the condition for the formation of a single atom, and this makes it philosophically needful to assume some agency radically different from any physical agency in our experience which could act upon the ether, endow it with energy of a particular sort and make permanent structures. In other words, it makes needful the assumption that matter and ether with such forms of energy as come into our experience are not sufficient to account for the physical universe as we find it, and therefore any scheme of philosophy which builds on these alone is a defective one. Such materialism has no warrant from the vortex ring theory of matter.

Whatever may be the truth as to the constitution of matter this much is certain now, namely, that it is not inert in any such sense as has been assumed, its relation to the ether is not yet mechanically explained and the properties of the ether itself cannot be inferred from the properties of matter. Of the properties of matter itself we are not yet fully conversant. The phenomena developed at low temperatures, at high temperatures, and with alternating electrical currents have been so much of a surprise to scientific men that more than ever they have been made aware that matter is more wonderful and its possibilities greater than ever were supposed by any, and there is no reason to suppose the end is reached in discoveries of this sort. If our knowledge of matter be but partial and of a kind to revolutionise former conceptions of it, and if our knowledge of the ether be still less perfect and of a kind not yet correlated with the knowledge of matter, it would seem to be hazardous for any one to limit the possibilities of either, and it would be well for one who undertakes to do this that he should show to others by some experimental work that his fundamental conceptions of his factors were worthy of some confidence.

TUFTS COLLEGE, MASS.

A. E. DOLBEAR.

## THE METAPHYSICAL $\alpha$ IN COGNITION.

### THE FAUST ATTITUDE IN PHILOSOPHY.

FAUST had studied all the sciences, had taken degrees in the four faculties, and become a famous professor in the university. Yet in the monologue with which Goethe opens his grand drama, he stands before us a self-confessed ignoramus, whose lectures are a mere waste of time, since he does not teach things worth knowing, and whose despair reaches its climax in the proclamation of the dreary doctrine that knowledge is impossible. He says :

"I've studied now Philosophy  
And Jurisprudence, Medicine,—  
And even, alas ! Theology,—  
From end to end, with labor keen ;  
And here, poor fool ! with all my lore  
I stand, no wiser than before :  
I'm Magister—yea, Doctor—hight,  
And straight or cross-wise, wrong or right,  
These ten years long, with many woes,  
I've led my scholars by the nose,—  
And see, that nothing can be known !"

Goethe's magnificent drama has exercised upon the minds of all civilised nations an influence scarcely less than that of the Bible ; and here we are confronted with a statement of the impossibility of scientific research. But if science is vain, what shall we do ? Are we not like miners in search of useful and precious metals, groping our way in the dark labyrinth of excavations underground, with the assistance of the lamp of scientific method ? If science after all is but vanity, had we not better extinguish our lamp and abandon ourselves to the mercy of circumstances ?

The Faust attitude is apt to exercise a baneful influence upon youthful minds who accustom themselves to finding the acme of wisdom in the conclusion that cognition is an unprofitable sport, knowledge vain, and science the empty conceit of a deluded brain.

Faust's words are often quoted in order to give the prestige of Goethe's authority to the agnostic doctrine; but let us bear in mind that we must explain the words of the passage from its context; they contain the exposition of the dramatic plot, embodying Faust's fundamental error from which all his later mistakes arise. Far from being endorsed by Goethe, they are proposed for refutation, and Mephistopheles, behind Faust's back, triumphantly says:

"If thou despisest reason and science, which can  
Alone afford the noblest power to man,  
Thou wilt be mine beyond recall."

["Verachte nur Vernunft und Wissenschaft,  
Der Menschen allerhöchste Kraft,  
Und du bist mein schon ganz gewiss!"]

The surrender of science is the way to perdition.

Faust began his studies from the top, not from the bottom. He began with philosophy, and we may well assume that the philosophy he studied consisted of that metaphysical verbiage which regards knowledge as a comprehension of things-in-themselves. Faust apparently imagines that so long as we do not know what things-in-themselves are, all our knowledge remains purely phenomenal and worthless. No wonder that he is desperate, for as he states himself, he "rummages in empty words."

According to the metaphysical method of philosophising we know of gold that it is yellowish or reddish, that it is heavier than other metals, possessing in its pure state a certain specific weight, that it does not corrode, is ductile or malleable, etc.; but all our chemical knowledge avails us nothing unless we understand what the essence of gold is.<sup>1</sup> Phenomenal knowledge apparently touches

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<sup>1</sup> John Locke, one of the soberest philosophers, says: As "it is plain that the word 'gold' stands in the place of a substance, having the real essence of a species of things made by nature," our notion that gold is something fixed, "is a truth

only the surface of existence, and we are told that what we need is metaphysical knowledge; but metaphysical knowledge can be as little obtained as the blue flower of Wonderland in the hopeless quest of which the knights-errant of yore were busily engaged.

The fatal error of metaphysics is the reification or hypostatization and substantiation of names. Gold is supposed to be an essence which is in possession of many properties. The properties are knowable, but the essence itself remains unknown. The error is obvious enough: the properties of gold are, in truth, qualities; gold is the sum-total of all its qualities, and we know what gold is, as soon as we know all the qualities of gold.

While metaphysicians mystified themselves and others with things-in-themselves and with the idea of metaphysical knowledge, the investigators in the various branches of science, nothing daunted, continued in their search for truth, and it became an established doctrine of the day, that science and philosophy were diametrically opposed. The philosopher looked down upon the scientist, whom he ridiculed for imagining himself in possession of a parcel of truth, while in fact his knowledge was a mere illusion. The scientist on the other hand smiled at the ingenuous pride of the philosopher whose grandiloquent phrases were either the vagaries of dreamers or trivial truisms concealed in the garb of pompous declamations. Some scientists tried to keep in contact with metaphysics, but others cut themselves loose from it, and Kirchhoff, in order to avoid the mysticism into which the metaphysical conception of knowledge is liable to involve a thinker, replaced the term "knowledge" by "description," declaring that the object of mechanics is to *describe* with exhaustive thoroughness and the greatest attainable simplicity the motions that take place in nature. Professor Mach, born of the same spirit of modern science, independently of Kirchhoff, spoke of

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which will always fail us in its particular application, and so is of no real use or certainty. . . . For if we know not the real essence of gold, it is impossible we should know what parcel of matter has that essence, and so whether it be true gold or no."  
—*An Essay Concerning Human Understanding*, III, vi, 50.

Among the philosophers of the eighteenth century Bishop Berkeley (commonly, and, even by Kant, erroneously regarded as a denier of reality) is the only one who reached the proper conclusion that substance does not exist.

cognition as an imitation or a mental construction of facts—*ein Nachbilden der Thatsachen*.<sup>1</sup>

After science and philosophy had separated, science began to split up into innumerable specialities, and philosophy lost itself more and more in the labyrinthian woods of metaphysics. The consequence was that the need of a reconciliation was strongly felt, and approaches were made from both sides to reach an amicable *status quo*, in order to keep philosophy sound and to preserve the solidarity of all knowledge in the sciences through the establishment of a philosophy of science.

Schopenhauer made an attempt at reconciling metaphysics with the sciences, and he was in many respects very helpful in preparing the way for the positivism of a Philosophy of Science. Nevertheless, he is still a metaphysician and takes his metaphysics seriously, for in the realm of his things-in-themselves nothing is impossible. The "will" is above space and time and can freely choose its own way of acting. Schopenhauer repudiates spiritism, but speaks about spirits, telepathy, clairvoyance, dreams and the dream-organ, the seat of which he believes to have discovered in the sympathetic system (!) in such a way that any medium should be delighted to quote from him. Schopenhauer's reconciliation of metaphysics and science consists in the proposition of a duality of cognition. There is, according to his philosophy, physical knowledge and metaphysical knowledge; the former is accessible to science, but not the latter. Schopenhauer says (*W. a. W. u. V.*, I, pp. 114-117):<sup>2</sup>

"If we turn to the wide province of natural science, which is divided into many fields, we may, in the first place, make a general division of it into two parts. It is either the description of forms, which I call *morphology*, or the explanation of changes, which I call *atiology*. The first treats of the permanent forms, the second

<sup>1</sup> See Professor Mach's great work, *The Science of Mechanics*, his *Monist* articles, *passim*, and especially his "Address Delivered Before the General Session of the German Association of Naturalists and Physicians, at Vienna, September 24, 1894," published in *The Open Court*, Nos. 376 and 377, and in his *Popular Scientific Lectures*.

<sup>2</sup> The quotations refer to the pages of the German edition. The English translation by Haldane and Kemp is full of errors and cannot be used without constant reference to the original.

of the changing matter, according to the laws of its transition from one form to another. . . .

"If, however, we surrender ourselves to its teaching, we soon become convinced that ætiology cannot afford us the information we chiefly desire, any more than morphology. . . . It determines, according to law, the order in which the phenomena originate in time and space. But it affords us absolutely no information about the inner nature of any one of these phenomena: this is called *Naturkraft* or power of nature, and it lies outside the province of causal explanation. The constant uniformity with which manifestations of nature appear whenever their known conditions are present, is called a *law of nature*. But this law of nature, these conditions, and the real nature of a phenomenon, in a particular place and at a particular time, are all that ætiology knows or even can know. The power of nature itself which manifests itself, the inner nature of the phenomena which appear in accordance with these laws, remains always a secret to it, something entirely strange and unknown in the case of the simplest as well as of the most complex phenomena. For although as yet ætiology has most completely achieved its aim in mechanics, and least completely in physiology, still the force on account of which a stone falls to the ground or one body repels another is, in its inner nature, not less strange and mysterious than that which produces the movements and the growth of an animal. . . . Consequently the most complete ætiological explanation of the whole of nature can never be more than an enumeration of forces which cannot be explained, and a reliable statement of the rule according to which phenomena appear in time and space, succeed, and make way for each other. But the inner nature of the forces remains unexplained, because the law which our explanation follows does not extend so far; it is limited to their appearance and succession. In this respect it may be compared to a section of a piece of marble which shows many veins beside each other, but does not allow us to trace the course of veins from the interior of the marble to its surface. Or, if I may use a humorous but more striking comparison, the philosophical investigator, when confronted with the entire ætiology of nature, must always feel like a man who, without knowing how, has dropped into a company quite unknown to him, each member of which in turn presents another to him as his friend and cousin, and therefore as quite well known, yet the man himself, while at each introduction he expresses himself gratified, has always the question on his lips: 'But how the deuce am I going to get at the whole company?'"

Schopenhauer forgets his own solution of the metaphysical problem. The forces of nature which in their innermost essence appear to us as inaccessible, are nearer to us than we imagine and we know them better and more intimately than anything else, for our own soul is the metaphysical essence of our bodily being and the company of strangers who introduce themselves as their brothers

and cousins are not only akin to one another, but also to our own existence. The gravity of the falling stone, the heat of the sun, electricity, magnetism, and all other energies are the cousins of our own vitality. They are life of our life, and our organism is but a transformation of these supposed strangers. We hold the key to Nature's secrets in our possession, for our own being is an immediate and most direct revelation of her metaphysical interior.

As to the first comparison of scientific knowledge to the inspection of the surface of a piece of marble, we must add here that Schopenhauer retracts his own view in the *Nachlass*, where he says (page 306):

"By the grain of the surface I cognise the whole marble without being obliged to follow the veins into the interior. The cross-section shows the same condition all through."

In another place *W. a. W. u. V.*, II, p. 190, Schopenhauer discusses the same problem of the relation of physics to metaphysics. He says:

"We find *physics* (in the widest sense of the word) also occupied with the explanation of the phenomena in the world. But it lies in the very nature of its explanations themselves that they cannot be sufficient. Physics cannot stand on its own feet, but requires a metaphysics to lean upon, whatever airs it may give itself towards the latter. For it explains the phenomena by something still more unknown than they are themselves; by laws of nature, resting upon forces of nature, to which vitality also belongs. . . .

"The physical explanation in general and as such requires further a *metaphysical* explanation, which affords us the key to all its assumptions, but just on this account it must necessarily follow quite a different path. The first step to this is that one should bring to distinct consciousness and firmly retain the difference of the two, hence the difference between *physics* and *metaphysics*. . . .

"I say, then, everything, and yet nothing, is physically explainable. As for the motion of the struck billiard-ball, so also for the thinking of the brain, a physical explanation must, at least in theory, ultimately be possible, which would make the latter comprehensible in the same sense as is the former. But even the former, which we imagine we understand so perfectly, is at bottom as obscure to us as the latter; for what the inner nature of expansion in space may be—of impenetrability, motility, hardness, elasticity, and gravity—remains, after all physical explanations, a mystery, just as much as thought. But because in the case of thought the inexplicable appears most immediately, a jump was at once made here from physics to metaphysics, and a substance of quite a different kind from all corporeal

substances was hypostatised—a soul was set up in the brain. But if one had not been so dull as only to be capable of being struck by the most remarkable of phenomena, one would have had to explain digestion by a soul in the stomach, vegetation by a soul in the plant, affinity by a soul in the reagents, nay, the falling of a stone by a soul in the stone. For the quality of every unorganised body is just as mysterious as the life in the living body. In the same way, therefore, the physical explanation strikes everywhere upon what is metaphysical, by which the explanation is annulled, i. e., it ceases to be explanation. Strictly speaking, it may be asserted that no natural science really achieves anything more than what is also achieved by botany: the classification of samenesses. A physical system which asserted that its explanations of things were really sufficient, and thus exhausted the nature of the world, would be genuine *naturalism*, represented by Leucippus, Democritus, and Epicurus down to the *Système de la Nature*, and further, to Delamark, Cabanis, and to modern materialists. . . . They endeavor to show that all phenomena, even those of mind, are physical. And they are right; only they do not see that all that is physical is in another aspect also metaphysical. But, without Kant, this is indeed difficult to see, for it presupposes the distinction of the phenomenon from the thing in itself. . . . Such an *absolute system of physics* as is described above, which leaves room for no *metaphysics*, would change the *Natura naturata* into the *Natura naturans*; it would be physics established on the throne of metaphysics. . . .

"Indeed, behind the reproach of atheism, which in itself is absurd and for the most part malicious, there lies, as its inner meaning a truth, which gives it strength; this is the obscure conception of such an absolute system of physics without metaphysics. Such a system would necessarily be destructive of ethics; and while theism has falsely been held to be inseparable from morality, this is really true only of *metaphysics in general*, i. e., of the knowledge that the order of nature is not the only and absolute order of things. Therefore we may set up this as the necessary *Credo* of all just and good men: 'I believe in metaphysics.'"

We learn from these passages the close connexion which obtains between the belief in things-in-themselves and the idea of a metaphysical knowledge, which is said to cast all physical knowledge into the shade. It is strange only that physical knowledge, which is supposed to be a mere illusion, reveals to us new marvels every day, while that boasted metaphysical knowledge in spite of its pretensions, remains either a vainglorious declamation or comes modestly down to the confession of agnosticism that here we are at our wit's end and that metaphysical knowledge is impossible.

Many a scientist is inclined simply to ignore the pretensions of metaphysics, but that will not do; for there is a truth at the bottom

of the idea of things-in-themselves which cannot be neglected, and the declaration that the nature of knowledge of any kind, in matters philosophical or scientific, is a description of facts will not be satisfactory until we understand the full importance of this definition. What we need is first a mutual understanding between philosophers and scientists and then a reconciliation of their points of view. We need a *philosophy of science*, whose duty it is to prune philosophical speculation, to render science conscious of its aim and methods, to correlate the various branches of investigation, and systematise its most important results in the grand outlines of a scientifically sound world-conception.

SCIENTIFIC KNOWLEDGE AND PHILOSOPHICAL KNOWLEDGE.  
CORRESPONDENCE WITH PROFESSOR JODL.

Three years ago we discussed (in *The Monist*, Vol. II, No. 2) the problem "Are there Things-in-Themselves?" and took the liberty of alluding to Prof. Friedrich Jodl's view of a modernised thing-in-itself. Professor Jodl, well known to our readers by his brilliant contributions to *The Monist*, as a representative thinker of unusual power and a scholar of first rank, (he is the author of a voluminous work, entitled *Die Geschichte der Ethik in der neueren Philosophie*,) does not discard the term thing-in-itself as we do, but retains it on the ground that cognition always leads to some  $x$ , as after all the best expression to denote the total mass of the unknown or unknowable, which is infinite and cannot by any finite amount of knowledge be noticeably diminished. In reply to our arguments Professor Jodl wrote as follows in a private letter:

"A formal rejoinder to your criticism you can hardly expect from me, for, despite what you say against my remarks on the "thing-in-itself," I am not sensible of any far-reaching difference between us. I agree perfectly with your definition of reality; reality (*Wirklichkeit*) is effectiveness—relationship; and, therefore, a "thing-in-itself," in the sense of an isolated "thing by itself" is a self-contradiction. And one more thing is certain. We can only call a thing real provided it produces effects, not generally only, but upon us. But how you propose, even admitting all this, to eliminate the mooted  $x$  from our cognition, I cannot exactly understand, no more than I can accept your definition of cognition. The definitions of Mach and Kirchhoff which you cite, are not philosophical definitions, that is,

epistemological definitions, but propædæutic or didactic definitions, by positive inquirers in special fields. In a philosophical sense I regard them as nothing more nor less than incorrect. It is quite right that we should regard a matter as explained scientifically when it has been shown to be a special case of a process already known; but as philosophers, it is hoped, we shall not deceive ourselves by forgetting that this known phenomenon closely viewed is also something about which we know nothing. We agree to leave it out of account simply because it is relatively near to our imaginations and of common occurrence.

"Take the most general example.

"When Newton saw the law of falling bodies in the central motion of the moon about the earth, the motion of the planets was "explained," and astronomers were able to "describe" that motion in Kirchhoff's sense as precisely as possible, that is, by means of mathematical principles. But what really takes place in gravitation, whether it is a general property of matter, whether it is the effect of mechanical causes—on that point, as you know, people are still, or rather, are *again*, racking their brains. In other words, this so-called "explanation" leads us to a phenomenon which we are unable to trace back to one that is better known, because our powers of representing it fail us, because it is not made up of any ulterior elements for us, and is therefore called an "elementary fact." Now this signifies simply that we cannot penetrate further here; for us this is a *datum*. But shall we make ourselves believe that because we cannot *see* further there actually *is* nothing further here? Gravitation is real. Surely, that means not only that it *produces* effects, but also that it is *effected*. And so it is with all "elementary" facts. Everywhere the lines of the co-ordinate system in which we draw up our picture of the world carry us into realms of obscurity. We can refuse—and that is the meaning of positivism—to fill up this realm of obscurity with vague pictures of fancy and idealistic speculations. But we need not on that account believe that the region of light which we survey is the universe.

"I would willingly discard the name "thing-in-itself" if it was at all suspected that any sort of ineradicable transcendentalism, dualism, or mysticism were ensconced behind it. With such stowaways I will have nothing to do. I am a convinced upholder of the monistic view of the world, and only mean that an honest confession of the limitations of our knowledge injures in no respect the cause of monism."

This was my reply to Professor Jodl:

"Many thanks for your valuable lines. Your exposition in defence of the  $x$  in the world, it seems to me, hits the point, and here apparently lies the difference between our views, so far as a difference obtains at all, with all agreements on other important points. I regard the acceptance of the Mach and Kirchhoff definition, or rather conception, of cognition in the philosophical domain, as very important for constituting a sound positivism. And why? Because this conception ren-

ders clear the situation ; because it overcomes the ignorabimus theory of agnosticism. Knowledge is not a distinct thing in the world. It is a fact which is intercatenated with other facts. It has a cause and serves a purpose. Knowledge develops in organisms for the purpose of their adaptation to surroundings. The purpose of knowledge is found in action. If an organised being strives for something, it constructs through a combination of representations a plan for action. An organised being is in need of such representations, which denote things in such an analogous and corresponding way, that the subjective image and the objective thing remain in a correct relation. Knowledge, therefore, is a portrayal not only in images but also in thought-symbols, for the purpose of regulating action. It is a representative remodelling of things.

"Knowledge is the product of cognition, it consists in the lucidity and correctness of representations. Cognition is that mental process through which we grasp the sameness of several phenomena. When Newton comprised the motion of the moon and the fall of a stone into one common formula, we were put in possession of a comprehension and explanation of these phenomena. They are now plain to us, and we can formulate their actions in exact terms and with mathematical precision, which can practically be applied as a basis for action. So far, good ! I do not believe that on this subject there is any difference of opinion ; but now you add, that this conception of knowledge and cognition is quite allowable for propædæutic and didactic purposes in the various specialities of science, but in a philosophical sense, it is wrong.

"I agree with you that it is right to concede honestly the limitations of our knowledge. We know comparatively very little of the world which in its infinity surrounds us. The circle of light visible to us is by no means the universe. This consideration, however, lies in another field, and I have never thought of combating this kind of agnosticism, which I call 'the agnosticism of modesty.' I maintain that knowledge consists in a correct representation of things, and *I cannot understand what knowledge could otherwise be*. Suppose we knew everything knowable, our knowledge would be an orderly system of representations ; there would be formulas, with the assistance of which we could under all circumstances predetermine the course of events. That the existence of facts is very wonderful cannot be denied ; and indeed in the same way the existence of all facts, without any exception, is equally wonderful. The existence of the world, such as it is, a cosmos arranged according to law, remains grand and overwhelming even to him who has through and through understood its harmonious order. If that is your mysticism, I adopt it. I have no objection to this mysticism of sentiment. On the contrary ; I endorse it. (See *Fundamental Problems*, page 157, and *Homilies of Science*, the chapter on 'The Value of Mysticism,' page 52.) This kind of mysticism is thoroughly in accord with clearness of reasoning and with the strictest precision of sound knowledge.

"Now, if knowledge is not mere representation, not a portrayal of things, not a description for the purpose of regulating our action, pray tell me, what can it be ?

If we call this kind of knowledge scientific knowledge, what do you mean by philosophical knowledge? I must confess that I do not know how you can answer this question.

"Schopenhauer says in a similar spirit: 'Physically, to be sure, everything, but metaphysically, nothing is explainable.' But what is a metaphysical explanation?"

"The sole answer which I can imagine is, that a metaphysical explanation expects to receive an answer as to why the world exists at all. This question may mean either, 'How did the world originate out of nothing?' or 'What is the innermost nature of things by dint of which they exist?' The former question finds its solution in the law of the conservation of matter<sup>1</sup> and energy, the latter is nothing but an inquiry into the most general feature of being.

[The former is the question after the first cause; the latter after the ultimate *raison d'être* of the universe. The ontological problem originates by a confusion of these two questions.]

"My answer would be, that the ontological problem is illegitimate. We apply the law of causation where we should inquire for the ultimate *raison d'être*. Ontological causality, so called, leads to the formulation of problems which are unsolvable, and to questions which are unanswerable.

"Cognition, the method of which consists in comprehending samenesses, ultimately leads to, and naturally ends in, a universal conception, which represents all the features common to all existence—the idea of being in general, of existence, or whatever we may call it. On the other hand, the law of cause and effect has not in the same sense a natural limit. We can go backward into infinity, and must again and again inquire for a cause of the cause. Only by committing the error of treating the law of reasoning after the analogy of the law of cause and effect, we inquire for the *raison d'être* of the ultimate *raison d'être*, and expect to find a still more general law than the universal law. We want a thought-symbol which would subsume the all-comprising thought-symbol of the universal under a still wider generalisation. Figuratively speaking, we ask, after having found the centre of the circle, 'Where is the middle of the centre?'

"As soon as we become conscious of the truth that all knowledge is representation, the ontological problem, so called, disappears and is recognised as an illegitimate problem.

"You say, 'we can refuse to fill up this realm of obscurity with vague pictures of fancy and idealistic speculations,' and you regard this as 'the meaning of positivism.' This, indeed, is the meaning of the French positivism represented by

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<sup>1</sup> We here include ether under the term "matter." Supposing the chemical elements such as we find them in experience were due to a condensation of ether, the law of the conservation of matter would not be overthrown, at least not in the sense in which it has been held by physicists.

Comte and Littré, to whom unknowable essences have still a real existence; but this realm of obscurity disappears when the sham problem has been recognised as a sham problem. From my standpoint there is not even a need of filling the realm of obscurity which has a fictitious existence, originating through the ontological problem in vague speculations.

"The so-called ontological problem which inquires after the ultimate *raison d'être* of existence as though the universality of being could be the effect of a cause, leads to a dualism. To be sure, your thoughts are thoroughly monistic, but you commit yourself to a dualistic conception when you say 'Gravitation is real: surely that means not only that it produces effects, but also that *it is effected*.' Here I cannot follow you. The gravitating stone produces effects. It is active itself. The stone in its connexion with the universe is doing work, and I do not find myself necessitated to seek for anything metaphysical behind the stone, by which 'it is effected' and in which we must seek the condition of its activity.

"I repeat once more, I fully recognise the immensity, the inexhaustibility, the grandeur, and the wondrousness of the existence of the world in all its details. I only object to recognising (paradoxically speaking) that kind of cognition which never can lead to cognition.

Professor Jodl wrote back:

"I have studied your long letter of February 17th with the deepest interest and with genuine satisfaction. As I had foreseen, it makes plain our essential agreement in a number of important points, and by your exceedingly lucid presentation puts me in a position to clear up the only point in which my view appeared to you dubious.

"You ask me what I understand by 'a knowledge that is not simply imitation and reproduction with a view to regulating conduct.'

"You exclude, as I think, in a very apt manner, the question concerning the ground of existence from the knowable. I would subscribe to all that, word for word. I feel no need whatever of filling out *tà metà tà φαινά* with pictures of fancy; and an agnosticism and positivism that should only be a golden bridge for mysticism, is in the highest degree repugnant to me. The Comtian formula, *Vivre au grand jour*, has far more importance for me as a theoretical than as a practical principle.

"But what, then, is my objection to your position, you will say. I can tell you that now, simply enough, in the words of people who are much profounder than I, and save, in doing so, paper and postage. I will ask you to take up Locke's *Essay Concerning Human Understanding*. First, in Book 4, Chapter 11, paragraph 8, you will find a full elaboration of that organic teleology which you emphasise. If, afterwards, you will read Chapter 3 of the same work, then Chapter 6, especially from paragraph 5 onwards, comparing with that Book 2, Chapter 23, *passim*, and Book 3, Chapter 6, paragraph 9, you will have pretty much all that *my* agnosticism signifies; particularly, if you will take the slight additional trouble of turning to Hume's *Inquiry*

*Concerning Human Understanding* and of reading over, Sections 4 and 5, "Sceptical Doubts Concerning the Operations of the Understanding." It would be impossible for me to state more plainly what I mean than is done there. You will not believe that I could hope, by means of any sort of higher speculation, which would be synonymous with higher folly, to smuggle in through a back door the knowledge there declared by a critical investigation of the nature of reason to be impossible. I accept completely your 'agnosticism of modesty,' but would have the expression understood in its extensive as well as its intensive sense. The philosopher cannot know things differently from what science does; but he must always keep before his mind the critical limitations and value of this knowledge. And in this sense only does the Mach-Kirchhoff definition appear to me insufficient.

"I believe that we now agree perfectly; for I feel sure that you will hold the expositions of Locke and Hume on the nature and limits of knowledge to be irrefutable."

Now we cannot deny that the passages cited by Professor Jodl contain much sound reasoning, and we children of the latter part of the nineteenth century are much indebted to our predecessors of the end of the seventeenth and the beginning of the eighteenth century. But it seems to me that there are several propositions of Locke and Hume to which we must take exception. I, for one, cannot regard their arguments as "irrefutable," and many of their expressions need a restatement. We confine ourselves to the most important points.

#### LOCKE'S UNKNOWABLE ESSENCE OF THINGS.

Locke says in his *Essay Concerning Human Understanding*:

"The nominal essence bounds the species—not the real essence which we know not.—III, vi, 7-9.

"Nor, indeed, can we rank and sort things, and consequently (which is the end of sorting) denominate them by their real essences because we know them not.—III, vi, 9.

"No proposition can be known to be true where the essence of each species mentioned is not known.—IV, vi, 4.

"This more particularly concerns substances. . . . For, how can we be sure that this or that quality is in gold when we know not what is or is not gold? since in this way of speaking nothing is gold but what partakes of an essence, which we not knowing cannot know where it is or is not, and so cannot be sure that any parcel of matter in the world is or is not in this sense gold; being incurably ignorant whether it has or has not that which makes anything to be called 'gold,' i. e., that real essence of gold whereof we have no idea at all: this being as impossible for us

to know, as it is for a blind man to tell in what flower the color of a pansy is or is not to be found, whilst he has no idea of the color of a pansy at all."—IV, vi, 497.

Strange how firmly Locke clings to his idea of substance, although he is quite conscious of the confusion into which it implicates his reasoning. He says (II, xxiii, 2):

"If any one will examine himself concerning his notion of pure substance in general, he will find he has no other idea of it at all, but only a supposition of he knows not what support of such qualities which are capable of producing simple ideas in us; which qualities are commonly called 'accidents.' If any one should be asked, 'What is the subject wherein color or weight inheres?' he would have nothing to say but, 'The solid extended parts.' And if he were demanded, 'What is it that solidity and extension inhere in?' he would not be in a much better case than the Indian before mentioned, who, saying that the world was supported by a great elephant, was asked, what the elephant rested on? to which his answer was, 'A great tortoise'; but being again pressed to know what gave support to the broad-backed tortoise, replied,—something, he knew not what. And thus here, as in all other cases where we use words without having clear and distinct ideas, we talk like children; who, being questioned what such a thing is which they know not readily give this satisfactory answer,—that it is something; which in truth signifies no more, when so used, either by children or men, but that they know not what; and that the thing they pretend to know and talk of, is what they have no distinct idea of at all, and so are perfectly ignorant of it, and in the dark. The idea, then, we have, to which we give the general name 'substance,' being nothing but the supposed, but unknown, support of those qualities we find existing, which we imagine cannot subsist *sine re substante*, 'without something to support them,' we call that support *substantia*; which, according to the true import of the word, is, in plain English, 'standing under,' or 'upholding.'"

Locke defines body as "an extended, solid substance," and soul as "a substance that thinks." Had not the idea "substance" been better omitted altogether? Instead of peopling all the domains of existence with unknown substances, would it not be enough to say that body is extension and solidity, and a man's soul is his thinking? Locke's philosophy shows already an antimetaphysical trend, so much so that the natural solution of the difficulty that this mythical substance is a redundant and gratuitous invention, seems to suggest itself in many passages, and the Bishop of Worcester actually accused Locke of "almost having discarded substance out of the reasonable part of the world." Anent this accusation, Locke replies

that he does "not know what to plead to," and quotes a string of sentences in which he asserts the existence of substance, the real nature of which is unknown. As to complex ideas, such as *horse* or *stone*, which are collections of several simple ideas, Locke says (II, xxiii, Note B):

"Because we cannot conceive how they should subsist alone, nor one in another, we suppose them existing in and supported by some common subject, which support we denote by the name *substance*; though it be certain we have no clear or distinct idea of that thing we suppose a support."

Locke declares that the uncertainty which hovers as a Damocles sword over knowledge, rendering it all through purely phenomenal, need not alarm nor disturb us, for "the relative certainty is as great as our condition needs." Our "evidence is as great as we can desire, being as certain to us as our pleasure or pain, i. e., happiness or misery, beyond which we have no concernment, either of knowing or being."

The consistent result of Locke's position is a suspension of judgment on almost every question of importance; for instance, the existence of spirits is to Locke a matter of faith (IV, xi, 12), "however true it may be that all the intelligent spirits that God ever created do still exist, yet it can never make a part of our certain knowledge." We have to abandon all attempts at demonstrating their existence and even at investigating the matter.

#### HUME'S SCEPTICISM.

The chapters cited by Professor Jodl from David Hume (*Enquiry Concerning Human Understanding*, Sec. IV and V) are of great importance, and we advise every lover of philosophy to study them carefully and critically, especially Section IV, which is entitled "Sceptical Doubts Concerning the Operations of the Understanding."<sup>1</sup> This chapter contains in *nuce* the fallacies of both the agnosticism and the metaphysicism of to-day.

Hume's scepticism is in itself a good thing, for he has put his finger on the sore spot of the problem of philosophy; Hume finds

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<sup>1</sup>Ed. L. A. Selby-Bigge, M. A., Oxford, 1894, pp. 25-39.

that all our reasoning concerning matter of fact is based upon our notion of causation. Our notion of causation again is based upon experience. But he continues: "What is the foundation of all conclusions from experience?" He adds: "This implies a new question which may be of more difficult solution and explication," and comes finally to the conclusion that as the difficulty is unsurmountable, we can have no other than "a negative answer." He says:

"Thus the observation of human blindness and weakness is the result of all philosophy, and meets us at every turn, in spite of our endeavors to elude or avoid it."

What are Hume's arguments for this most distressing conclusion which, if it were true, would necessarily leave a gap in every scientific world-conception?

Hume maintains that our knowledge of causation "is not in any instance attained by reasonings *a priori*, but arises entirely from experience" (p. 29). He declares:

"The mind can never possibly find the effect in the supposed cause, by the most accurate scrutiny and examination. For the effect is totally different from the cause, and consequently can never be discovered in it."

And the gist of his arguments is summed up in the following statements:

"That all arguments concerning existence are founded on the relation of cause and effect.

"That our knowledge of that relation is derived entirely from experience.

"That all our experimental conclusions proceed upon the supposition that the future will be conformable to the past.

"To endeavor, therefore, the proof of this last supposition by probable arguments, or arguments regarding existence, must be evidently going in a circle, and taking that for granted, which is the very point in question."

Hume sees pretty clearly the ultimate conclusions of his theory which are nothing less than a denial of the authority of reason. He declares in a long footnote on pages 44-45 that the distinction between reason and experience, useful though it may be, is at bottom "erroneous" and "at least superficial."

All our reasoning is based, according to Hume, upon a *petitio principii*. That a certain cause has always produced a special effect

in the past is no reason why the same cause will produce the same effect in the future. Hume says :

"If you insist that the inference is made by a chain of reasoning, I desire you to produce that reasoning. The connexion between these propositions is not intuitive. There is required a medium, which may enable the mind to draw such an inference, if indeed it be drawn by reasoning and argument. What that medium is, I must confess, passes my comprehension ; and it is incumbent on those to produce it, who assert that it really exists, and is the origin of all our conclusions concerning matter of fact."

Hume presents his theory with great modesty and at the same time with extraordinary assurance. He says :

"The best expedient to prevent this confusion, is to be modest in our pretensions ; and even to discover the difficulty ourselves before it is objected to us. By this means, we may make a kind of merit of our very ignorance."

Hume proposes the question as much for the sake of information, as with an intention of raising difficulties, keeping, as he says, his "mind open to instruction, if any one will vouchsafe to bestow it upon" him ; but having endeavored to show that none of the branches of human knowledge can afford an argument that might have escaped him he feels confident that his scepticism is impregnable. He says :

"This negative argument must certainly, in process of time, become altogether convincing, if many penetrating and able philosophers shall turn their enquiries this way and no one be ever able to discover any connecting proposition or intermediate step, which supports the understanding in this conclusion."

In the course of time, many able thinkers have adopted Hume's scepticism and by a kind of common consensus his negative solution has developed into a philosophical dogma which has acted like a bane upon thought and is still blockading the progress of philosophy.

There is one strange thing about Hume which should have made him suspicious of his own proposition. His theory and his practice do not agree, and he feels that his philosophy is sicklied over with the pale cast of thought. He says in his *Treatise of Human Nature*, IV, 2, p. 218 :

"This sceptical doubt, both with respect to reason and the senses, is a malady."

To escape the evil effects of scepticism, Hume's advice is as follows :

"As the sceptical doubt arises naturally from a profound and intense reflexion on those subjects, it always increases, the farther we carry our reflexions, whether in opposition or conformity to it. Carelessness and inattention alone can afford us any remedy. For this reason I rely entirely upon them."

With all due deference to the keenness of the great Scotchman we cannot say that a philosophy whose sole remedy for a malady of reason lies in "carelessness and inattention" breathes the spirit of genuine inquiry or can make any claim of being "irrefutable."

Hume proposes not to make any use of his scepticism when dealing with questions of real life. So emphatic is he in the inapplicability, and that means a practical rejection, of his negativism that he says :

"None but a fool or madman will ever pretend to dispute the authority of experience."

Experience, according to Hume's theory, is a chaos of isolated items, which can never acquire authority, but in practice he considers the denial of its authority as madness. What Hume here calls "authority of experience" is nothing but his vigorously repudiated scientific certitude, the method of which, commonly called reason, is gained through a systematisation of experience.

Hume feels the sting of his inconsistency and he explains his position by the following consideration :

"My practice, you say, refutes my doubts. But you mistake the purport of my question. As an agent, I am quite satisfied in the point ; but as a philosopher, who has some share of curiosity, I will not say scepticism, I want to learn the foundation of this inference. No reading, no enquiry has yet been able to remove my difficulty, or give me satisfaction in a matter of such importance. Can I do better than propose the difficulty to the public, even though, perhaps, I have small hopes of obtaining a solution? We shall at least, by this means, be sensible of our ignorance, if we do not augment our knowledge."

Considering Hume's arguments I freely grant that all our knowledge is ultimately derived from experience, but my definition of experience differs from the traditional notion. When Hume speaks of experience, he always enumerates a number of isolated cases, and

calls cause and effect "two objects following one another." Kant, in close agreement with Hume's conception, calls experience "the raw material of our sensuous impressions" and carefully excludes from it all purely formal knowledge and rational judgments. Now there is no doubt about it, that formal knowledge, be it geometrical, arithmetical, logical, or purely rational of any kind, cannot be derived from the sense-element of experience, after we have carefully eliminated from experience the quality of form. If, however, we understand by experience the whole effect of events upon sentiency, including both qualities, form and sensibility, we shall see that all the formal sciences including pure reason, our conception of the purely formal (generally misnamed the *a priori*), the notion of causation, arithmetic, geometry, algebra, and logic can very well be derived from experience. It is quite true, as Kant convincingly proves, that the purely formal sciences are ideal; they are ideal constructions built up in our own mind: but the material out of which we have raised these magnificent structures, which are the notions of pure forms in various domains—pure space, progress in time or units of counting, mere thought-relations such as genus and species, etc., etc.,—have been furnished us by experience. Our notions of pure form are abstractions which we have derived by limiting our attention to pure relations and excluding the things among which they obtain.

By regarding experience as a number of isolated sense-impressions without coherence, Hume starts with a wrong idea of causation. Instead of analysing some phenomenon, he makes a synthesis of what he is pleased to call cause and effect, and finds no necessary connexion among them. He should first have investigated the facts and then explained the meaning of the words cause and effect; but he takes their meaning for granted, and since this meaning is nothing but a confused notion of unvariable succession, it is natural that the whole argument of Hume's scepticism is built upon sand.

The law of causation is a purely formal law and it can justly claim the same validity as all mathematical and logical theorems. It is at bottom the same law as the law of the conservation of matter and energy, which simply means that nothing can originate out of

nothing, and that all processes are transformations. The phenomena which we observe are changes, not creations and not annihilations. It is true that cause and effect are radically different but they are not without definite connexions. Cause and effect are not "objects following one another," as Hume says, but interrelated events.

Poison is not a cause, but the act of taking poison; neither is a dead mouse the effect, but the death of the mouse. Every cause is a motion, an act, or an event, which in a given system of conditions through a disturbance of their equilibrium produces other motions, acts, or events, ultimately resulting in some definite change, called the effect.

When we inquire for the reason why the cause takes effect, we want to know the natural law according to which a given agent acts under given conditions. Natural laws formulate in exact terms the qualities of things, and are nothing more nor less than descriptions. The progress of science warrants the assumption of regarding all natural laws as forming one great system in which the more particular laws are applications of the more general laws to peculiar conditions, and all the general laws form various aspects of the universal order of nature which is at bottom the same as the simple truths of the formal sciences, such as  $1 + 1 = 2$ , or the angles of equilateral triangles are equal, the intrinsic necessity of which can easily be understood.

Hume's conception of causation is so confused that he constantly mixes up the ideas cause and reason, and speaks of "general causes" and "ultimate causes," when he means reasons of reasons, requiring as an answer more general and universal laws.

Our expectation that the future will resemble the past is based upon the idea that every event that happens is due to a change of place. The state of things and their actions may become very different from what they are now, and conditions may arise which will produce unprecedented constellations, so that the same causes will no longer be attended by the same effects. But, whatever may happen, events must always be due to a cause and will be the result of a mere transformation.

The medium which Hume could not find and which as he says

is required to avoid the vicious circle of founding causation upon experience and experience upon causation, is contained in the eliminated portion of experience, which in his days was called the *a priori*, and which we call the purely formal or the relational. The surrounding world, through contact with which experience originates, is not like a bag of peas, a disconnected number of isolated objects; the world, our own subjectivity included, is a system of relations which in their general features (or, as Germans would say, in their *Gesetzmässigkeit*) are universal. We can describe them as what we call the laws of form.

Our ideal systems of purely formal relations can be used for reference in measuring and counting, and thus the purely formal sciences become the tools of investigation, without which science would be impossible. Our methods of investigation, which include counting, measuring, and the notion of causality, have been derived from experience; they are the formal elements of experience reduced to system and making possible a higher kind of experience, science, which is methodical observation, experiment, and a systematic description of experience.

This is no vicious circle, but an evolution from lowly beginnings to a higher condition, and every stone of the structure of the philosophy of science, which sets forth and explains the principles of scientific inquiry, rests upon a safe foundation, the ultimate basis being experience. The medium which, as Hume said, passed his comprehension, is the systematisation of the formal elements of experience in ideal reconstructions for a so-called *a priori* application to future experiences. And we are so sure of the reliability of this medium, that, as Hume himself confesses, "none but a fool or madman will ever pretend to dispute it or reject it as the great guide of human life."

Reason, in our conception, is systematised experience; it is an ideal and methodical reconstruction of the relational element in experience. We agree accordingly with Hume when he declares that there is no reason without experience. But we cannot grant that all reasoning is mere custom, and that therefore pure reason pos-

sesses no authority save that of custom derived from a haphazard accumulation of many experiences.

Hume misunderstands the very nature of reason. Reason is not a collection of many fortuitous observations, but the quintessence of their necessary interrelations extracted from experience. Reason is not one fact among other facts, not a faculty besides other faculties, such as sensation, but a method, and on the reliability of this method the very possibility of science depends. If we could make no other inferences than such as are drawn from disconnected experiences and not from the systematisation of experience which is called reason, all our arguments would indeed be vain, the conjunction of cause and effect would be "arbitrary and casual," and philosophy simply the recognition of the utter hopelessness of scientific aspirations.

Hume concludes his arguments with this remark :

"If I be wrong, I must acknowledge myself to be indeed a very backward scholar."

We deny the logic even of this last proposition. Hume may have been and indeed he unquestionably was a great scholar and a keen philosopher. But the fact that a man is a scholar does not make him infallible. Agassiz was a great scientist, and yet he was mistaken on the most important problem of his science. The most penetrating thinker may err in his solution of the burning question of his day, while less able minds may hit the truth, which is either due to a greater clearness of comprehension, or may sometimes happen because they are less bewildered by the knowledge of too much trivial detail.

We cannot say that Hume's expositions go to the bottom of the problem. He sees the problem but does not contribute to its elucidation. He is seeking its solution, so far as the looseness of his terms allows him to do so, but has a peculiar instinct of avoiding a discussion of those things which would have afforded him the best assistance in solving the problem.

Hume's errors have become so popular that they permeate even to-day our whole intellectual atmosphere and exercise a baneful influence upon the minds of many prominent thinkers. How injurious

the effect of this anodyne is may be gathered not only from the popularity which Mr. Spencer's agnosticism enjoys, but also from such cases as the late Professor Romanes's *Thoughts on Religion*. Hume's negativism has produced a stagnancy in the philosophical world which prevents the mass of our best thinkers from understanding the needs of the time and finding the solution of the great religious problem that now agitates the world. The propositions made in these pages are still a voice crying in the wilderness, but the time will come, and is near at hand, when their truth will be recognised in both the churches and the universities. Professional philosophers must bestir themselves lest they be left behind in the general advance of the sciences; and the clergy, when pressed harder and harder by scepticism, will find in the pages of *The Monist* a panoply for the defence of religion—not of their antiquated creeds, but of a regenerated faith which has been purified in the furnace of science.

#### KANT'S IDENTIFICATION OF THE IDEAL AND THE SUBJECTIVE.

Kant was the first to understand the sweeping importance of Hume's scepticism, and he undertook to answer his arguments. Kant called attention to the fact that while Hume had questioned the necessary relation of cause and effect, there were a number of other notions, not less universal and necessary, such as mathematical theorems, the validity of which Hume has never thought of doubting. All the formal knowledge of the mind, under the name of pure reason, is in the same predicament and should receive the same treatment. But Kant's solution of the difficulty as offered in his *Critique of Pure Reason* is almost as bad as, if not worse than, Hume's negativism, for Kant, after having proved all formal knowledge to be ideal, by a strange confusion of ideality with subjectivity, insisted upon the mere subjectivity of time, space, logic, and all other purely formal conceptions. It is true, he always speaks of ideality, but he means subjectivity and thus renders all objective or scientific philosophy illusory. Hence his proposition that things-in-themselves are unknowable.

Sensations, it is true, considered as pure feelings are subjective,

but their various forms symbolise the things through contact with which they originate, and thus they have reference to objective realities: their meaning is not subjective but objective. We grant that there is a difference between the objective world, which appears to us as material, and the subjective world, which is sensory, but one feature is common to both, viz., the formal or relational. If the formal were, as Kant claims, purely subjective, the theory that knowledge is impossible would be justified, and agnosticism would be firmly established.

Man's comprehension of facts is, as it were, a bridge between the subjectivity of his soul and the objectivity of the world in which he lives. Man's knowledge describes his surroundings as the sailor's chart depicts the seas on which he sails. Sense-images and ideas represent the objects of reality and their relations; and the import and practical usefulness of ideas grows according as they approach the ultimate ideal of cognition, which is the comprehension of all difference as a difference of form according to universal formal laws.

Kant distinguishes two sources of knowledge, sensation and pure reason. Sensation in itself is blind, and pure reason in itself is empty. Sensations are incidental and particular, coming to us singly in a haphazard way and without affording any information concerning a necessary connexion. However, the most striking character of pure reason is the intrinsic necessity and universality of its statements; and Kant maintains that from the beginning or *a priori* it lies ready in the human mind in a state of latency to be roused by sense-experience. Kant argues that, since pure reason with its necessity and universality, including the conceptions of space and time and the categories, is not imported into the thinking subject by sensation, it must be purely subjective or ideal. It is a form of the thinking subject, not of the objective world.

Now, we do not deny the ideality of pure reason. Our space-conception, our time-conception, our numbers, geometry, logic, and the schemata are ideal; they are systems of pure thought and belong to the realm of ideas; they are mental constructions. Indeed, they are *purely* ideal, for mathematical points, geometrical triangles, pure numbers, and logical categories do not, as such, exist in real-

ity. At the same time they are in Kant's sense of the word "transcendental."<sup>1</sup> Yet while they are purely ideal and transcendental they are by no means purely subjective. Kant uses the term ideal in the sense of subjective, but the two terms are by no means identical. Both terms are similar and may sometimes cover the same ground so as to be used as synonyms and to allow a substitution of the one by the other. Nevertheless, they are quite disparate; for instance, the feeling feature of sensations is purely subjective, but it is not ideal.

We define ideal as belonging to, or having reference to, the realm of ideas; subjective as belonging to, or having reference to, the realm of the subject. While the laws of form (including the laws of time and space) are purely ideal constructions, we cannot say that time and space are purely subjective. Form is a quality of objective existence, and all bodies are possessed of definite shapes. Form and matter are inseparably connected, and our first notions of pure forms are abstractions. Time and space, it is true, are, as Kant argues, inseparably connected with the thinking subject, but only in so far as the thinking subject is at the same time an object moving about in the objective world as a body of a definite shape and with definite whereabouts. The ideal constructions of mathematics, arithmetic, and logic, are built of materials quarried from the mines of objective existence, the knowledge of which has been acquired by experience. They convey the most reliable information concerning certain universal and therefore very important features of objects and become thus the tools of cognition. We must have them ready *before* we can begin a systematical investigation of objects, and in this sense alone they are *a priori*.

The necessity and universality of a statement, which are to Kant the most important evidence of subjectivity (or, as he says, "ideal-

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<sup>1</sup> Kant distinguishes "transcendent" and "transcendental," the former being that which lies beyond the possibility of experience, the latter that which is the condition of experience. The notions of time, space, and any other kind of relation (including causality) are transcendental, but not transcendent. All purely formal ideas are mental tools, for cognition consists in tracing the samenesses or differences of form and science would be impossible without measuring or counting.

ity"), indicate, in our conception, objectivity. The most elementary particle of pure form (if we be permitted to speak of form as if it could exist in parts like a material substance) contains *in nuce* all the conditions of its complex potentialities. Given the progression by steps, and we have the elements from which by various manipulations the whole science of arithmetic with its most involved calculations can be derived. Given the possibility of motion in all directions, and we can by merely remaining consistent build up geometry in all its branches with its wonderful harmony and intrinsic necessity. The same process performed in the same way produces the same result, and this is the key to the perplexing mystery that, by the help of an ideal construction, we gain information about the nature of objects. The comet does not obey the subjective theories of the astronomer's mathematics, but the astronomer's mathematics is a mental construction from purely formal elements which are universal features of objective existence, applicable to all the analogous cases which may take place in any part of the universe. The model which we construct corresponds to the reality, so that the former affords information concerning the latter. Our purely formal systems are ideal, but they describe features of objective reality. They are transcendental (i. e. indispensable conditions of experience) only because they describe objective features.

The formulations of the formal laws, as we have them in mathematics, logic, and other formal sciences are, it is true, purely ideal, they are mental constructions, but the formal laws themselves are for that reason not merely subjective; they are objective and constitute the most important feature of reality, which is the immanent and all-pervading God whose presence is so intrinsic that we are unable to think any possible kind of existence without it; and the more clearly this feature of reality is mirrored in a sentient being where it is called reason, the higher that being ranges in the scale of evolution, the more truly it can be said to be an image of God and the more far-reaching will be the sway of its dominion over the forces of nature. In a word, manhood is the incarnation of the formal law in its application to the problems and duties of practical life.

No better evidence can be given in favor of the philosophy of

science than the truth that there are not various reasons different in kind. Neither can reason ever be self-contradictory, but is and must always remain one and the same, unfailing in its consistency and harmonious unity.

The uniqueness of reason does not indicate its latency in the subject as subject, but its latency in existence as existence. There is no existence bare of that formal element which by the same actions would not develop always the same result, for it is this sameness alone that constitutes the intrinsic necessity and universality of all formal laws of thought, called reason. This formal feature of existence, which is at the bottom of all natural law by making the same conditions produce the same results, is the source of cosmic order; it is the *Tao* of Lâo-tze, the Amitaba of the Buddhists, the *Adrishṭa* of the Brahmans, the Christian Logos that was in the beginning and has become flesh in the Son of Man. If anything is supernatural, it alone is worthy of the name, for it is above this real world of ours in so far as it is a condition that applies to any possible world. If there is anything not purely subjective, but objective, universal, and an indelible feature of reality, it is the germ of reason, the intrinsically necessary presence of law in any imaginable kind of existence.

#### METAPHYSICS MODERNISED. PROFESSOR DEUSSEN'S PHILOSOPHY.

The latest history of philosophy, which comes from the scholarly pen of Prof. Paul Deussen, is in every respect abreast of the times, except in the one point which is so deeply ingrained in the school-philosophy of to-day: it still clings to the metaphysicism of philosophy. Professor Deussen defines philosophy as being in the main "the search after the thing-in-itself." He declares that it is peculiar to philosophy to regard the object of its inquiry, which comprises the totality of all existence, as "something that *needs a further explanation*," treating it as "a problem that points *beyond itself*." He says: "While all other sciences are physical, philosophy is metaphysical." Although he denies that philosophy goes beyond experience in a transcendent way, he yet insists that "philosophy

penetrates experience in order to seize its kernel, while all physical science remains engaged with its shell. Thus all philosophy is ultimately metaphysics."

The distinction between the metaphysical kernel and the physical shell of nature was the basis of Haller's agnosticism, which Goethe so emphatically rejected by saying :

"Natur hat weder Kern noch Schale  
Alles ist sie mit einem Male."

There is no harm in using allegorical expressions, such as kernel and shell, but there is a danger in building upon them philosophical theories. Nor is there any objection to the term "metaphysical," provided it be clearly defined, and all misconstruction, as though it meant something that points beyond experience, or leads behind nature, be excluded.

Prof. Deussen has also written a text-book on *The Elements of Metaphysics*, which is of interest as an elaboration of a metaphysical philosophy, which, so far as historical and philological scholarship are concerned, is thoroughly up to date. The very first page, however, shows the lack of a truly scientific spirit, so much needed in philosophy. Professor Deussen begins dogmatically with the proposition that two standpoints are possible, the empirical and the transcendental. The former, inquiring into phenomena, is "physics" in the widest sense of the word ; the latter, inquiring after the thing-in-itself, is "metaphysics." In paragraphs 7 and 8 we are told that time and space are infinite. In paragraphs 8 and 10 he says : "Everything that exists necessarily exists in space, for otherwise it would be nowhere, and accordingly would not exist at all." The same argument is repeated in paragraph 10 : "Everything that happens necessarily happens in time, for otherwise it would happen never, and accordingly it would not happen at all." This start is characteristic of a metaphysical philosophy.

A positive philosophy begins with a statement of facts. Facts are our data which have to be explained, but it is not easy to determine what "facts" in this sense means. The facts from which we have to start are the experiences commonly called sense-perceptions ;

and upon a further inquiry, we discover that they are the elements which in the long process of evolution have built up our soul.

As to time and space, the positive philosopher does not predict their infinity, but inquires into the nature and origin of these notions. We find that both are the product of abstraction, and would say that an idea from which the notion of space is excluded represents something whose nature is independent of space. Thus there are indeed many things which exist without being either in time or space. The existence of non-spatial realities is an old *crux* in philosophy, as we know from *The Questions of King Milanda*, where Nagasema maintains and proves the positive existence of Nirvâna, although Nirvâna is neither in time nor in space. The unbeliever is refuted by a *reductio ad absurdum* and Nagasema proves that according to the logic of his adversary wisdom is a non-entity, for it is nowhere.

Space is not (as Kant has pointed out) a mysterious entity. It is not a thing-in-itself, not a metaphysical box in which existence is contained. But it is a feature of existence. Space is extension, and extension is a quality of the objective world. As extension, space represents the interrelation of things, including, if they are in motion, also all possible interrelations, viz., direction and all possible change of direction, or, in a word, the possibility of motion.

The infinity of space would be mysterious, if it were a box in which the world is contained; but it ceases to be mysterious as soon as we understand that it is the possibility of motion which in every direction is unlimited.

Time, in the same way, is not an incomprehensible monster which swallows the things that are now, and, at the same time, begets the things that will be. Time is as little a thing-in-itself as space. Time is not that which contains all the events that take place, but it is an abstract idea derived from the facts of our experience. Time is nothing but the purely formal aspect of change, considering the succession and duration of events. Time is the measure of duration, which is accomplished through the establishment of a unit of duration.

Professor Deussen assumes metaphysics in the very beginning

of his philosophy. No wonder that after a critical examination of the material under his hands he finds throughout a metaphysical residuum, casting a glamor of mysticism over his whole world-conception, which may be characterised as a modernised edition of Schopenhauer's philosophy.

#### PHILOSOPHY DEFINED.

But what becomes of philosophy if metaphysics is gone? Is philosophy merely (as it was to Auguste Comte) the sum-total of scientific knowledge, or has it still a province of its own?

Philosophy has, indeed, a province of its own, the limits of which are quite well defined. Philosophy is engaged with such inquiries which, according to their nature, are common to all sciences. An investigation into the constituents of water belongs to the domain of a special science called chemistry. But a consideration of the methods of science concerning the comprehension or explanation or systematisation of facts belongs to the department of philosophy. Yet, for that reason, philosophy, as we understand it, is not superscientific, but is a science among the sciences. And there are three great departments in philosophy:

First, philosophy is above all *methodology*. It has to investigate the basis of all the sciences; it has to define and explain the scientific methods which the scientist instinctively employs as tools of scientific inquiry. We need an elucidation of such ideas as causation, natural law, cognition, experience, reason, and truth.

Secondly, philosophy must be *systematology*. From the data furnished by the most matured results of the various sciences philosophy constructs, with the help of the best scientific methods accessible, a world-conception which must be at once consistent and systematic.

And, thirdly, philosophy has to apply the results of this systematised world-conception to practical life. It must be what is generally called *world-wisdom*. Philosophy must teach man his place in nature. It must enable him to strike the proper attitude in life. It must attune our souls to the harmony of the whole of which we

are a part, and advise us as to the right conduct in life. This is ethics in the broadest sense of the word.

Philosophy as here conceived may be called "the philosophy of science," because it recognises the importance of defining philosophy as the science of science, and insists that its methods and modes of operation are in principle not different from the other sciences. Philosophical cognition is essentially the same as scientific cognition.

#### THE MONISTIC CONCEPTION OUTLINED.

Having gone over the ground of the most important objections that can be made to the proposition of conceiving the nature of knowledge as description, we shall now give a brief *résumé* of the function of cognition in its various stages. It is not our intention to give exhaustive proofs and arguments, but to present the subject in a dogmatic way, so as to make its presentation concise, and to indicate in great outlines the far-reaching importance of this theory.

The world around us appears to our senses as matter moving in space, but the world in us, our soul, consists of feelings or states of awareness which rise from sensations of all kinds to the higher spheres of ideas and abstract thought, arousing in us impulses and volitions of all degrees of intensity and conscious lucidity. Anything perceived in the outside world of matter moving in space is called "object," the inside world of feelings is called "subject," and we observe at once that our own being appears in our own perception as a part of the objective world. We are soul, but we appear to ourselves and to other sentient beings as a body moving about in space.

The channels of our notions concerning the world of objects are our senses, and comparative physiology teaches that they have developed by a gradual adaptation of an undifferentiated sentiency to the various actions by which the skin of organised beings is affected. The various contacts produce various disturbances in sentient matter and each kind of disturbance in the objective body, if strong enough to become conscious, is subjectively felt as an analo-

gous kind of feeling. Here the theory suggests itself that each form of objectivity is endowed with an analogous subjectivity, so that all the bodies of the same or a similar shape with ourselves, acting according to the same or similar principles, are possessed of the same or similar souls. The evidence of this monistic conception is so overwhelming that in practical life all living beings accept the theory unconsciously and endow all bodies which in their actions exhibit purpose with sentient souls according to their various organisations. However, we cannot without falling into inconsistency escape the conclusion that other objective existences too, those which appear inert and which by scientists are classified under the head of inorganic nature, possess their exact subjective equivalent, for the material of the soul-endowed world of organised life is the same as that of the inorganic world, the latter is the inexhaustible reservoir for the sustenance of the former, and we have good reasons to believe that the former spontaneously under still unknown conditions develops from the latter. The lowest kind of subjectivity which must be supposed to be present in the gravitating stone or in the chemical action of the elements is, so far as we can judge, not sentient, but it contains in an unorganised state the elements of sentiency; inorganic nature does not feel, but it is endowed with the potentiality of feeling.

We conceive the world as an immeasurably great system of interactions, and say that every action is subjectively a feeling or an element of feeling and objectively a motion. An idea which I think is subjectively a state of awareness and objectively a brain-motion. The feeling and the motion are two aspects of one and the same fact.

Wherever existence has developed into a sentient organism, every impression which is felt as a peculiar sensation leaves a trace, the form of which is preserved in the flux of organised life; and when another impression of the same kind creates another correspondent sensation, it is transmitted to the memory trace of its predecessor which is thereby revived and is felt to be the same. Thus this feeling naturally comes to indicate the presence of the same object whatever it be and sensations naturally develop into

symbols or signs representing the object of contact and processes that take place in the objective world.

Sensations are the basis of all knowledge ; they picture our surroundings in the feelings which the various objects in various ways, according to their nature, rouse by their contact with the sentient organism. Sensations are not the things pictured in them, nor do they inform us of the nature of things-in-themselves, they only represent the things so as to show which is which. Representativeness is the characteristic feature of the soul and it is the root from which cognition grows.

The simplest kind of cognition is perception ; it is the picturing of objects in their analogous forms of feeling, so that their sameness or the similarity of a new sensation with former sensations is perceived, or, as we correctly say, re-cognised.

Cognition in its primitive form is a reference of the new sensation to an old one, into whose memory-trace it fits ; it is the reduction of the unknown to the known ; a subsumption of the unfamiliar under a class of former experiences which are familiar.

Explanation is a more complex kind of description. It is a making plain, so that the changes of a process can be traced in all their details.<sup>1</sup>

Natural science has found it convenient of late to express the causal law as a preservation of matter and energy. The law of the preservation of matter and energy is, closely considered and in spite of its formulation in a positive assertion, a negative statement : it means that matter and energy are neither increased nor diminished ; and its positive counter-formula would be : "all change is purely change of form ; it is not a change of the innermost nature of reality ; or, briefly, causation is transformation." The terms, "matter" and "energy," are abstractions which denote two general qualities, the identity of which can be traced in the various transformations of all phenomena ; they represent the universal features of that which is real, not entities, not substances in the

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<sup>1</sup>There are two views as to the nature of explanation which we may call the metaphysical and the scientific, or the dualistic and the monistic views. Compare the chapter on Explanation in *The Monist*, Vol. III, No. 4, p. 585 et seq.

sense of independent existences, not things-in-themselves. We have to add that matter in this connexion is intended to mean mass, for the law of the preservation of matter does not preclude the production of matter from ether by condensation, or any other procreation of the material universe from ether, or perhaps even of ether from a more rarified world-substance—in brief, of sense-perceptible reality from what we might call potential reality.

A formulation of two or several phenomena, so as to exhibit their essential identity, showing that their difference is due to a difference of form, resulting according to the forming factors of different conditions conformably to the universal laws of form, is called comprehension; and the most important advantage of comprehension is the simplicity which in this way explanations or systematic descriptions acquire.<sup>1</sup>

#### PROFESSOR MACH'S ANTI-MECHANICALISM IN PHYSICS.

We have often taken occasion to express our great admiration of Professor Mach, and we have quoted him as one of the best authorities who accept the definition of knowledge as "description," in full consciousness of its sweeping importance, not only for science, but also for philosophy. But there is one point on which we cannot agree with Professor Mach's conception of cognition. He regards the mechanical aspect (the change of form) not as we do, as one of the universal aspects of reality, but as one abstraction of reality among many other abstractions, and he considers it as perfectly equivalent with such notions as electricity or chemical affinity. He regards the reduction of all physical processes to motions as a chimerical ideal, and declares: "It is simply an accident of history that the development of the principle of energy in physics was not connected with the practical applications of electricity." He says in his article "On the Principle of the Conservation of Energy" (*Popular Scientific Lectures*, p. 151):

"Mechanical events as simple motions in space and time best admit of observation and pursuit by the help of our highly organised senses. We reproduce me-

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<sup>1</sup> Ernst Mach speaks in this sense of the economy of thought.

chanical processes almost without effort in our imagination. Pressure as a circumstance that produces motion is very familiar to us from daily experience. All changes which the individual personally produces in his environment or humanity brings about by means of the arts in the world, are affected through the instrumentality of *motions*. Almost of necessity, therefore, motion appears to us as the most important physical factor. Moreover, mechanical properties may be discovered in all physical events. The sounding bell trembles, the heated body expands, the electrified body attracts other bodies. Why, therefore, should we not attempt to grasp all events under their mechanical aspect, since that is so easily apprehended and most accessible to observation and measurement? In fact, no objection *is* to be made to the attempt to elucidate the properties of physical events by mechanical *analogies*.

"Granted that we had a perfect knowledge of the mechanical processes of nature, could we and should we, for that reason, *put out of the world* all other processes that we do not understand? On this principle it would be really the simplest course to deny the existence of the whole world."

The fact is that of molar motion we have a visual image, but our ideas concerning electricity and combinations by chemical affinity are mysterious, and their actions remain unintelligible until we can explain them by analogous events in molar mechanics. It is no accident but a matter of necessity that we cannot help trying to understand all phenomena as transformations, or changes of place; and if we are unwilling to consider this state of things as due to the nature of objective existence, we should have to say, such is the constitution of sentient beings, and especially of the thinking subject which has acquired the faculty of reason, that it must explain changes as motions which produce new constellations.

In our opinion the mechanical aspect is a more general feature of reality than electrical and chemical phenomena, all of which belong to the same category of objective nature. The attempts of physicists to understand the latter as a species of the former by considering them as molecular mechanics is no accident, but the necessary outcome of the natural relation that obtains among these abstractions. That class of phenomena to which our sensory organs are, as it were, adapted so as to show them in the focus of our direct observation naturally appear as molar motions and we cannot help thinking that such more subtle changes in nature, as for instance chemical combinations, are of the same character, only on a smaller scale.

If atoms were rational beings, molecular mechanics would be to them such changes of place as we call molar motions, for the sensorium of atoms would be so adjusted that the changes that take place in the molecules would be in the field of their direct observation. Our molar motion would be to them, what the cosmical motions of the stars are to us: they would not be directly observable and any knowledge of them could only be inferred by a complex process of reasoning.

We do not regard it as purely accidental that mechanical laws are more satisfactory explanations than formulas of electrical or chemical actions. The latter are mere names of unexplained processes; and they will remain mysterious to us until we understand how the various particles of matter move about according to purely formal laws.

If Professor Mach does not follow us it is partly the scientist's punctilious anxiety not to leave the *terra firma* of facts, partly perhaps because he does not emphasise, as we do, the radical difference between the formal and the purely sensory elements in experience. He makes the statement that science results in an economy of thought as a matter of fact and does not attempt to explain how economy of thought is possible. We find that the universality of the formal law is the reason why a recognition of it naturally results in an economy of thought. From our standpoint the law of the conservation of energy is an empirical formulation of the philosophical statement "all causation is transformation." We may add that whether or not Professor Mach would be willing to follow us, our view does not stand in contradiction to his but can be conceived as a wider application of it and a further corroboration of its main principles.

The ultimate aim of comprehension is to reduce all difference to a variety of form and thus to describe reality in terms of formal sciences. Hence the importance of measuring and numbering; of graphic formulas or any other conceptions of tridimensional relations. All phenomena in the world would be explained if their differences could be understood as due to a difference of form, while the innermost nature of reality is conceived as the same throughout.

THE METAPHYSICAL  $\alpha$  NOT UNKNOWN.

There is no serious objection to regarding all scientific cognition, knowledge, explanation, and comprehension, as description or representation of facts in mental symbols. But we have stated ourselves that explanations can be satisfactory only when the descriptions of phenomena are reduced to terms of form, while the innermost nature of reality is supposed to be and to remain the same all through. Is not what we here call "the innermost nature of reality" the surd, which lies without the pale of science, and whether or not we call it metaphysical, will always remain unexplained?

No, it does not remain unexplained, for it is the very material on which and with which our cognition is written; it is the best-known reality and most familiar of all facts, for it is the innermost nature of our own being. It is both the slate and the slate-pencil, which in their interaction produce those writings which we call the soul.

We must bear in mind that monism teaches the inseparableness of subject and object, and the innermost nature of that which appears to you my body is what I call "my soul"; while the subjectivity, which varies with the forms which it ensouls, is an intrinsic feature of all objectivity, and there is, according to our best scientific notion, no particle of the ultimate substance of which the world consists, which could not, as well as any other particle, in the course of its migration, have become an essential ingredient of the thinking brain.

Schopenhauer was perfectly aware of this fundamental doctrine of monism, but he makes no good use of it. Schopenhauer says:

"The source of the knowledge of metaphysics is not *outer* experience alone, but also *inner*. Indeed, this is most peculiar to it, and hereby the decisive step which alone can solve the great question becomes possible . . . that at the right place it combines outer experience with inner, and uses the latter as a key to the former."

Schopenhauer solves the metaphysical problem as to what is

the innermost nature of things by saying, it is the same as the innermost nature of ourselves, viz., the will, using the term "will" in a peculiar sense; and the trend of his solution is correct.

This procedure practically identifies the metaphysical with the subjectivity of existence, and we accept it without hesitation; but in doing so we bear in mind that we do not enter here into a domain from which science is debarred. An investigation of the subjective nature of ourselves and other sentient beings is commonly called psychology and not metaphysics, and the methods of psychology are the same as the methods of any other science. Explanations are as much descriptions in psychology as in physics; there is only this difference, that what Schopenhauer calls metaphysics is, as it were, generalised psychology. We attribute to other beings, according to their form, subjectivities analogous to those which our own bodies possess. Now, suppose we call such a generalised psychology by the traditional term "metaphysics," and the innermost nature of reality "things-in-themselves," we should most certainly not be justified in saying that our cognition invariably leads us to an  $\alpha$ , that we always arrive at an unknown quantity, concerning the nature of which we cannot have the faintest idea or comprehension.

The method of monism is to interpret the facts of objective experience in the terms of our subjective nature; and to interpret the phenomenal universe as analogous to our body. All reality appears to sentient beings as matter moving in space, but it is in itself either soul, or where it is not actual soul, potential soul, viz., that subjectivity which, as soon as it is organised, becomes soul according to its form.

The science of a generalised psychology or metaphysics would have to explain how the ultimate constituents of man's soul are the same as the subjectivity of a burning flame or of a falling stone. It would have to explain how the subjectivity, plain and simple as it appears in inorganic nature, builds up a higher life in organised animal nature, where it becomes feeling, and how feeling becomes mind by being representative of the various objective conditions which produce a variety of feeling.

Schopenhauer says (*ibid.*, p. 202):

"How can a science that is derived from experience lead beyond experience, and thus deserve the name of metaphysics? It can *not* do so in the same way as, according to the rule of three, the fourth number, or as from two sides and an angle the third side of a triangle is found. . . . The whole of experience is like a cryptography, and philosophy is its explanation, the correctness of which is proved by the sense that appears in the context. If the whole is only understood in its full depth and connected with inner and outer experience, it must be possible to be interpreted and explained out of itself."

If metaphysics denotes "that which ventures beyond experience" (this is Schopenhauer's definition), we deny the existence of metaphysics, for our subjectivity is as Schopenhauer himself says, inner experience. Our soul is the metaphysical essence of our bodily being, and what is better known to us than our own existence? Neither is the object of metaphysics, viz., the so-called thing-in-itself, or the innermost nature of being, i. e., the subjectivity of existence, anything that lies beyond or behind nature and outside of the range of science. On the contrary, it is the heart of nature, its essence or the inner nature of nature. The metaphysical, accordingly, is so far from being outside of experience that it is the very cornerstone of the possibility of experience. It does not lie beyond the limits of our cognition of nature<sup>1</sup> and involves us in no ignorabimus. It does not

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<sup>1</sup>Du Bois-Reymond speaks of the *Grenzen des Naturerkennens*.

Du Bois-Reymond's proposition, that "if only one single brain-atom could be moved by thought one-millionth fraction of a millimetre from the path prescribed by the laws of mechanics, the whole world-formula would cease to have meaning," is quite true, if by thought is understood the mere subjectivity of thought, while the objectivity is considered as operating without our taking reference to its subjectivity. But we must not forget that there are no thoughts which are not at the same time brain-motions; and there is no question about it that while a man thinks the atoms of his brain do move; and these brain-motions, small though they are, are of enormous consequence, for they, being the exponents of conscious aims, bring purpose into the world of physical causation, which renders "the world-formula" such as a physicist may propound, by confining his attention to mechanics alone, but is immeasurably more complex, without annulling it. Du Bois-Reymond's proposition is misleading, because the word "thought" is an abstraction, and there are as little ideas which are not at the same time motions, as there is gravity outside of mass. He might as well have said: "Gravity exercises no influence in the world which is strictly governed by mechanical law. If one single dust-particle could be moved by gravity one-millionth fraction of a millimetre from the path prescribed by the laws of mechanics, the whole world-formula would cease to have a meaning." And the same proposition can be varied *ad libitum*. In the same sense, "chemical affinity" can-

commit us to a belief in anything intrinsically unknowable, which is always the confession of a philosophical insolvency. It is so far from being foreign, unknown, or incomprehensible to us that it forms the very essence of our own existence. For this same reason Goethe objects to the idea of the inaccessibility of Nature's interior. He says:

"Schritt für Schritt  
Sind wir im Innern."

The method, however, by which we arrive at the conclusion that the inner nature of other things is analogous to our own inner nature is exactly the same rule of three which Schopenhauer regards as insufficient. He himself applies it unconsciously, while Clifford gives precision to Schopenhauer's solution of the problem by saying:

"As the physical configuration of my cerebral image of the object  
"Is to the physical configuration of the object,  
"So is my perception of the object (the object regarded as complex of my feelings)  
"To the thing-in-itself."

In other words:

As the brain-structure (which is matter in motion) is to its analogous idea, so the object is to the innermost nature of the object. Or as cerebral activity is to my soul, so the material object (the phenomenon) is to the soul of the object as the object is in itself.

This conception, which is a consistent monism, recognises the spirituality of all existence, but it excludes the possibility of ghosts. Ghosts are bodiless souls, and souls, wherever they exist in reality, will, by the very fact of their existence, appear as material bodies to other sentient beings, and must originate, act, and evolve according to the mechanical laws of change. They cannot be conjured by magicians from the vast inane, but must develop in nature according to the laws of nature. On the other hand, the laws of nature do not give us an account only of purely material phenomena; by revealing

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not move a single atom, and if it could, the laws of mechanics would be meaningless.—(Compare *The Monist*, Vol. III, No. 4, pp. 612-615, where this subject is discussed in detail.)

the laws of the physical exterior we can decipher the spiritual (the subjective, or, if you please, metaphysical) interior of the various objects that people the world around us.

#### CONCLUSION.

A clear conception of the nature of knowledge, is one of the most indispensable requisites of a sound world-conception; for knowledge—using the word in a broad sense—is the nature of mind. It is the characteristic attribute of the soul of man. If we understand what knowledge is, we know the nature of our own mentality, and what can be of greater importance to us than the fulfilment of the old injunction *ΓΝΩΘΙ ΣΕΑΥΤΟΝ!* Know thyself!

The importance of a comprehension of the innermost nature of being (which we call subjectivity) is greatly exaggerated. It is frequently regarded as the object of metaphysics, and according to a fashionable mysticism claimed to be incomprehensible. If this metaphysical centre of being could be known, so the argument commonly runs, we should have the key to all the riddles of the universe. Its comprehension is regarded as a kind of philosopher's stone, and if a scientist could find the value of this  $x$ , he would be in possession of the solution of all problems. This is a great error. A misconception of that feature of existence which in living substance becomes feeling and in man blazes forth as consciousness, will throw all thought into confusion, but a right conception of it does not involve the advantage that in the future we can dispense with the drudgery of scientific investigation, as though the acquisition of further knowledge had become redundant. Faust's hope of opening channels of wisdom by magic is a mistake. The world-problem does not lie in what Schopenhauer calls the metaphysical, but it reveals itself in objective nature. There it must be sought and there alone it can be found. He who does not find the correct solution should find fault not with reality, but with himself. The world is not unintelligible, but the man who is unable to decipher its wonderful cryptography is unintelligent. Faust is quite conscious of the fact that his inability to acquire genuine knowledge is his own fault. He says:

"The spirit world no closures fasten ;  
 Thy sense is shut, thy heart is dead.  
 Disciple up ! Untiring hasten  
 To bathe thy breast in morning-red."

["Die Geisterwelt ist nicht verschlossen :  
 Dein Sinn ist zu, dein Herz ist todt.  
 Auf, bade, Schüler, unverdrossen  
 Die ird'sche Brust im Morgenroth."]

The elements of subjectivity, being, as it were, the substance out of which the soul has been fashioned, are the same in man as in the dust that is trodden under foot. And Christ's words are literally true when he says: "God is able of these stones to raise up children unto Abraham."

The metaphysical nucleus of reality, the in-itselfness of things and of ourselves does not contain the key to any problem either of science or philosophy. The identity which we must attribute to its nature in all its elementary forms, renders it unimportant as a factor in explanation. The diversity, however, which it exhibits in its various combinations, now as phenomena of inorganic nature; now again as the irritability of a plant, and here in us as the soul of a rational being, depends upon the forms which it assumes, and these forms become tangible, visible, and observable in the objective world. The parallelism of subjectivity and objectivity teaches us that the things-in-themselves of objects are as much combinations of the elements of the metaphysical essence of all reality, as the objects under our observation appear to our senses as combinations of material elements.

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*Summa summarum* : The source of knowledge is inner as well as outer experience, observation as well as introspection, but metaphysics is of no avail. Metaphysical philosophies must give way to the only true philosophy—which is the philosophy of science.

The peculiar nature and the worth of man lies not in what metaphysicians call the thing-in-itself,—granting here the propriety of the term,—it lies not in the presence of any metaphysical essence, not in the subjectivity of his existence, but in the truth of the im-

ages and ideas of which his soul consists. Man's soul is a description of reality *sub specie aeterni*; it is an image of God. God enters, as it were, in parts with every sense-impression into sentient creatures, and his likeness grows in clearness as the traces thus produced in living feelings reconstruct the World-Logos, which in man's soul appears as the divine spark called Reason. The progress of man's comprehension of natural phenomena, revealing the cosmic order of the universe and teaching the right conduct in life, is the history of God's revelation.

EDITOR.

## THE UNSEEN UNIVERSE.

WONDERFUL indeed are the number and the variety of the objects which nature discloses to our view, both in the heavens above, and in the earth beneath. A little reflexion will, however, show us that the things which we can either see, or of which any of our senses can inform us, must nevertheless be almost inconceivably small and unimportant in comparison with those objects in the universe which from one cause or another remain necessarily undiscernible.

It is indeed possible to demonstrate that objects do certainly exist which are not only utterly screened from view, so far as our present resources extend, but which there is not the least reason to anticipate that any future discoveries can introduce to our ken. We might illustrate this proposition from a variety of departments of nature. It is, however, my present purpose to speak only of that unseen universe, which is the most astonishing of all the many astonishing subjects which the astronomer leads us to contemplate.

The whole question as to whether an object shall be visible to us or not is largely a matter of illumination. If the object be bright enough, and if the distance at which it is situated be not too great for the degree of brightness which the object possesses, then that object will generally be visible. We should, however, provide that the sensibility of the retina to the impression of light is not to be reduced by the presence of an undue quantity of diffused light from some other source. A star is generally just visible to us at night by the unaided eye if it possesses that degree of brightness, indicated in the language of the astronomer, when he says that the star is of the sixth magnitude. If that star were moved further away then it

would presently cease to be visible to the unaided eye, though it might still be discerned with the aid of a telescope. The larger the telescope, the greater the depth to which it is able to probe into space. Indeed, it may be said that a star just visible to the unaided eye, would have to be removed to a distance about one thousand times greater, before it had ceased to be visible in the great Lick telescope, or in the great reflector of Lord Rosse at Parsonstown. Were the star to be translated ten thousand times as far as when just visible to the unaided eye, it would apparently be then utterly beyond the reach of any telescope at present existing. It seems, however, possible that even this distance might not be so great as to preclude some stars from recording their impressions in a photographic apparatus when a sufficiently long exposure has been given.

It should, however, be remembered that though in broad daylight stars shine over our head, yet we cannot in general see those stars. The reason is simply that the nerves of the retina are so strongly acted upon by the abundant floods of daylight that the twinkle of even the brightest star fails to produce any recognisable impression. No doubt stars, or at all events, the brighter stars, can be rendered visible in daylight with our telescopes. Supposing, however, that we had lived in perpetual daylight, as we might have done if it had happened that the earth turned round the sun, with the same face always directed thereto, just in the same way as the moon goes round the earth; then, if we had had no telescopes we should never, under ordinary circumstances, have seen the stars. We might indeed have occasionally glimpsed the planet Venus, but with this possible exception we should never have known anything about any other bodies in the universe, save the sun and the moon. All that glorious sidereal spectacle which is disclosed to our gaze at night, would have been utterly unknown. The starry firmament would have formed an invisible universe.

Suppose that a being lived on a world constituted in this manner, then if the sun were to be suddenly eclipsed the whole of that universe, previously invisible and unknown, would have been instantly displayed to the astonished observer. There he would behold for

the first time the Great Bear and Orion, and the other glorious constellations, and sweeping across the sky he would see the marvellous yet delicate glow of the Milky Way. If the being were further told that every single unit in this display of twinkling points of light indicated the existence of a sun in many cases quite as great and as glorious as that sun which was the familiar object in his skies, if he were led to realise that these suns existed in scores of millions, and that each one of them was surrounded by a system of planets, attending upon it in just the same way as the planets revolve around the sun, then indeed he would see that the universe as known to him before the eclipse was nothing compared with that hitherto unseen universe of which he had for the first time been permitted to obtain a brief view. The problem of the invisible universe would indeed be one which would astound his imagination.

It is my object in this article to show that the present state of science forces us to believe that there is around us an invisible universe, which far more widely exceeds even that extended universe which we can see, than does our visible universe exceed that of a being whose celestial knowledge was limited to the recognition of the existence of a sun and a moon. This is indeed one of the most striking conceptions which science has to offer to our contemplation. There are different ways in which it can be presented to us, and I shall try to develop it with such detail as its importance deserves.

Let us suppose that an Australian, born and reared in his country, is at length able to fulfil a long-cherished wish, and visit that ancient home in Great Britain from which so many colonies have sprung. He starts on his voyage, passes through the canal, issues from the Strait of Gibraltar, and presently approaches the shores of Great Britain. But as he does so, it happens to be night—he can see nothing whatever of the coast, the only intimation that he has of his proximity to the long-desired shore is given him by the light-houses. He sees a bright point; he is told it is the famous Eddystone; he passes on a little further, when another bright point comes into view, indicating the Needles at the Isle of Wight. Then again a twinkling point appears, and he discerns the Forelands.

But, except those lights such as I have named, or other objects of the same description, the voyager can see absolutely nothing of the shores of England. Those beacons, however admirably they may fulfil their functions, do not illumine the objects around them in such a way that they would be visible to the mariner. All the mariner can see, and this is the important point, are the lights themselves; he cannot see, he can get no direct intimation whatever, concerning the objects which lie even in the vicinity of those lights.

Let us suppose that our traveller were so absurd as to refuse to entertain any other impression of England save that which could be derived from his midnight voyage along the coast. To him England would then consist of nothing but the few lights which might be discerned at night from the sea. Everything that land contained, its hills and valleys, its rivers and lakes, its great cities and noble edifices, its wonderful commerce, its teeming myriads of inhabitants, its counties studded with vast manufactories, its abounding life and energy of every description, would be invisible. The whole of that unparalleled collection of human activities and human interests, which are associated with the name of Great Britain, would be utterly unknown to an observer whose opportunities were so limited. This wonderful country could only be represented to his imagination by the few beacons which were visible at night. The visible England, so far as he was concerned, would be a few luminous points, the invisible England would be that marvellous country which those lights were inadequate to illuminate.

This illustration will prepare us for the argument on which I am about to enter. The sun to which we owe so much is no doubt a potent agent of illumination, within the narrow limits, the relatively narrow limits, I ought rather to say, of our solar system. But for purposes of illumination through the length and breadth of the universe, the sun is as utterly inadequate, as a farthing rush light would be for the illumination of a continent. We are apt, quite naturally, to attribute to the sun the possession of a peerless splendor. We must, however, remember that the earth is always comparatively so close to the sun, as to receive abundantly of its radiation, and occupying that position we can enjoy light enough, and

heat enough, to supply all our wants. These services, however, the sun would not be able to render to us, did it not happen that our globe was so close to the source of beneficence. How slender must be the solar effect in illuminating or warming the universe generally, may be inferred from the well-known fact, that many of the bright stars, for example, Sirius or Arcturus, are intrinsically far more brilliant than the sun, but yet how feeble is the twinkle which they can transmit to our point of view. No doubt any objects which may lie in the immediate vicinity of Sirius or of Arcturus might derive from either of those bodies, an illumination quite as splendid, or even far more splendid than that which is supplied to the earth by the proximity of the sun. But sun and stars alike are equally ineffective as illuminating agents, when the length and breadth of the universe are considered.

When, therefore, we raise our eyes to the sidereal heavens, we are to some extent in the same condition as the traveller whom we have supposed to reach the shores of England at night. All he can actually see are the luminous beacons, but those beacons have no effective power for the illumination of the surrounding objects, though they themselves are visible. This point being admitted the significance of what is implied by the title of this paper, will at once become apparent. I set aside of course, any reference at present to the planets. They have no light of their own, it is true. They are rendered visible in consequence of the illumination, which, like the earth, they derive from the radiation of the sun. For our present purpose we are, however, considering not the small group known as the solar system consisting of the earth and planets, all these objects are in close proximity to our own sun; but what we are now considering are the stars and other objects sunk into space all round, at distances compared with which the dimensions of the solar system are utterly insignificant.

It is obvious that the traveller we have supposed, would make a most tremendous mistake if he were to conclude that there was nothing whatever in England except a few beacons round the coast. Yet this, it must be observed, is all that he could possibly know of England, if his view of it were obtained at night from the sea, and

if he had no other sources of information. We are very much in the same condition when we look at the sidereal universe. We view it in the dark, in a darkness only rendered more impressive by the numerous beacons twinkling throughout the extent of space. There is no commanding and universally spreading source of light to render celestial objects visible in the same way, as the sun makes terrestrial objects visible here by day. We see on looking into the heavens no more than the celestial beacons. We see only the bright points which are themselves lighted, we cannot discern the objects which having no intrinsic luminosity are unable to appeal to our sense of vision. I do not think that there is in the whole of astronomy a conception more striking than that which is thus suggested. As the coast-lights on our shores are nothing in comparison with the extraordinary variety and multitude of interesting objects in England, which are wholly invisible to the mariner passing at night, so the celestial beacons which we can see are as nothing in comparison with the extraordinary multitude and variety of objects in that invisible universe, which it seems must be forever screened from our view. For every lighthouse which may be counted around the coasts of Great Britain, there are within the circuit of these coasts, thousands of fields, thousands of beautiful trees, there are many lakes and rivers, there are villages, towns, cities, and great numbers of population. So, too, for every one of the visible stars which can be counted in the skies, there must be hundreds or thousands, indeed, there are doubtless millions of other objects, utterly beyond our ken. Of the existence of these unseen objects, and of their nature and properties, we can only occasionally become aware, in a most indirect, indeed, I might say in a most casual manner. Now, indeed, the sublimity of the conception of the unseen universe becomes adequately unfolded. Reflect on the number of luminous stars which the heavens contain, think of the thousands of stars which are visible to the unaided eye, think of the tens of thousands of stars which are visible in small telescopes, think of the hundreds of thousands of stars which are visible in a moderate telescope, and of the abounding millions of stars which are disclosed by our mightiest instruments, or which are represented on our most

sensitive photographic plate. Then remember that each one of these stars is, as it were, a luminous beacon, and that the invisible objects must be incredibly more numerous than the beacons themselves.

In this way we begin to realise that for each body which we see, glowing as a fervent star, there must be thousands or millions of other bodies often as large, often doubtless a great deal larger than the luminous stars. We do not see the great majority of celestial objects from the simple fact that they do not, generally speaking, possess a temperature sufficient to make them glow in the manner necessary for vision. If, indeed, the mind is baffled in the attempt to comprehend the scale of the universe which contains, as we know it does, millions of stars, many of them as bright and as glorious as the sun, what are we now to think when it is brought before us that each one of these stars is itself only one of millions of objects, which happens by the fortuitous circumstance of temperature to be rendered visible?

We may illustrate the line of reasoning that we have followed in another way. We have often heard of those beautiful fire-flies, which, in clouds of dancing points of light, form a striking feature after the night has fallen in certain warm latitudes. Suppose that some celestial being who was taking a survey of our earth at night, when all artificial sources of illumination were absent, was trying to obtain some notion as to the nature of the animated inhabitants of the earth. His survey being made in the darkness would necessarily preclude him from being able to perceive the greater number of living forms. The huge bulk of the elephant, or of the rhinoceros, must pass unnoticed, the stately giraffe would not be visible, lions, tigers, and bears, would be as invisible as cows or sheep. Birds of every size and of every hue must be utterly unknown to an observer so circumstanced, and still more would innumerable hosts of minor creatures remain undetected. Such an observer might in fact hastily come to the conclusion that there was, indeed, no life whatever on this earth. Suppose, however, that he made a very minute inspection, he might discern here and there the little gleam of light from a glow-worm on a mossy bank, here and

there he might detect the indications of phosphorescent sparks in the sea water, here and there he would be gratified by the sight of a cloud of fire-flies dancing about in the darkness. If this celestial being, having duly noticed these things, having counted the number of glow-worm twinkles that he could see, and having depicted or measured the phosphorescent points and the clusters of fire-flies, were straightway to rise up and say that now he knew all about the distribution of life on this earth, how greatly, indeed, would he have been mistaken. No doubt it may be admitted that he would have seen a very large number of creatures. The number of fire-flies in their clustering millions may really rival, for aught I can tell, the number of stars in the Milky Way, or that of the minute stellar points in the deep background of the firmament. But how ludicrously incomplete would be the knowledge of the natural history of this earth, which could possibly be obtained by one whose only opportunity for observing the life on our globe was obtained under the limitations we have sketched. All the more important forms of life would be quite unknown to such an observer, he would really have perceived only an infinitesimal part of the total life on the globe. Those creatures alone would be visible to him, which possessed intrinsic luminosity. The creatures so endowed form it may be an interesting, but certainly only a most insignificant part of animated nature.

In like manner, when we raise our eyes to the skies, we see it is true, a myriad of glittering gems, but these are only the glow-worms and the fire-flies of the universe. That is to say, they are the objects which are visible in virtue of the light which they themselves dispense, while objects which are not endowed with the capacity for radiating luminosity must be as invisible to us, as the birds and beasts on the earth would be to the spectator whom we have just been considering. There can, however, be little or no reason for doubting that the invisible objects in the universe exceed those which are visible in consequence of their luminosity, in a proportion quite as remarkable as that in which the ordinary animals devoid of luminosity exceed those which possess phosphorescent qualities. We must again affirm that the only objects which can be seen by us

in the skies, (setting aside the planets and a few other bodies in the solar system,) are those objects which are self-luminous in consequence of their intensely high temperature. A star is a mass of matter heated to such an extent that its effulgence is perceived far and wide. It must, however, be borne in mind, that for a portion of matter to be heated so highly, is always a more or less exceptional phenomenon. From the very nature of the case, the condition it implies is a temporary one. We find little difficulty in conceiving the eternal existence of matter at a temperature no greater than that of the surrounding space, but when a piece of matter, solid, liquid, or gaseous is heated to incandescence, it is in the very nature of things that this condition is but transient. The high temperature may last, no doubt, as the high temperature of the sun has lasted, for millions of years. It cannot, however, be perpetual, and when at last that portion of matter sinks again to the temperature of space, there it may remain to all eternity unless in so far as by the chapter of accidents it may be again kindled into temporary luminosity. It thus appears that the normal and ordinary state of the matter in the universe is to be cold, non-luminous, and therefore utterly invisible to us. Those portions of matter which are at any moment luminous must certainly be very greatly inferior in numbers to those which are at the same time in the normal condition. Every line of reasoning demonstrates that the material universe, so far as it is visible, can only be an almost inconceivably small fragment of that unseen universe, which, from not possessing the necessary quality of luminosity, is effectually shrouded from our view.

The conclusion to which we are thus led is, indeed, a remarkable one. Think first of the visible stars in their units, in their constellations, and in their myriads, so vast that the imagination of man fails to realise their number. But a much mightier effort would, however, be necessary if we would seek to form a truly comprehensive estimate of the contents of the universe. We are to reflect that all objects which we can see constitute in all probability not one thousandth, perhaps not one millionth, part of the material heavens. We are to reflect that each one of those suns which we

find glowing in the depths of space, is only one out of an untold number of other bodies, many of which are quite as large and many of which are very much larger. Any object that we do see is able to attract our attention merely because of the accidental circumstances that it happens at this particular epoch to be glowing with luminosity. It is therefore essential for any one who desires to obtain a due conception of the scheme of things celestial, to recognise that the glorious universe which we can behold is as nothing compared with that material system of which we can never become adequately informed, and which we call the unseen universe.

ROBERT STAWELL BALL.

CAMBRIDGE, ENG.

## THE PRESENT PROBLEMS OF ORGANIC EVOLUTION.

THE doctrine of evolution may be defined as the teaching which holds that creation has been and is accomplished by the agency of the energies which are intrinsic in the evolving matter, and without the interference of agencies which are external to it. It holds this to be true of the combinations and forms of inorganic nature, and of those of organic nature as well. Whether the intrinsic energies which accomplish evolution be forms of radiant or other energy only, acting inversely as the square of the distance, and without consciousness, or whether they be energies whose direction is affected by the presence of consciousness, the energy is a property of the physical basis of tridimensional matter, and is not outside of it, according to the doctrine we are about to consider.

As a view of nature from an especial standpoint, evolution takes its place as a distinct science. The science of evolution is the science of creation, and is as such to be distinguished broadly from the sciences which consider the other operations of nature, or the functioning of nature, which are not processes of creation, but processes of destruction. This contrast is especially obvious in organic evolution, where the two processes go on side by side, and are often closely intermingled, as for instance in muscular action, where both destruction of proteids and growth of muscular tissue result from the same acts, or use. Physiology, or the science of functions, concerns itself chiefly with destruction, and hence physiologists are especially prone to be insensible to the phenomena and laws of progressive evolution. The building of the embryo, remains a sealed book to the physiologist unless he take into account the allied bio-

ogical science of evolution, as resting on the facts of botany, zoölogy, and paleontology. In his reflexions on the relations of mind to matter he is likely to see only the destructive functioning of tissue, and not the history of the building of the same during the ages of geological time.

J. B. P. A. Lamarck<sup>1</sup> thus contrasts the theories of direct creation, and creation by evolution. The former asserts: "That nature or its author in creating animals has foreseen all possible kinds of circumstances in which they may have to live, and has given to each species a permanent organisation as well as a predetermined form, invariable in its parts; that it forces each species to live in the place and the climate where one finds them, and to preserve there the habits which it has." He then states his own, or the evolutionary, opinion to be: "That nature in producing successively all species of animals, commencing with the most imperfect or simple, and terminating its work with the most perfect, has gradually complicated their organisation; and these animals spreading themselves gradually into all habitable regions of the globe,—each species has been subjected to the influence of the circumstances in which it is; and these have produced the habits which we observe, and the modifications of its parts." On an earlier page of the same chapter, Lamarck thus formulates the laws of organic evolution, to which his name has been attached.

*First law.* "In every animal which has not passed the time of its development, the frequent and sustained employment of an organ gradually strengthens it, develops and enlarges it, and gives it power proportional to the duration of its use; while the constant disuse of a like organ weakens it, insensibly deteriorates it, progressively reduces its functions, and finally causes it to disappear."

*Second law.* "All that nature acquires or loses in individuals by the influence of circumstances to which the race has been exposed for a long time, and in consequence of the influence of the predominate employment of such an organ, or of the influence of disuse of such part, she preserves by generation, in new individuals

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<sup>1</sup> *Philosophie Zoologique*, Paris, 1809, Vol. I., Chap. VII.

which spring from it, providing the acquired changes be common to both sexes, or to those which have produced new individuals."

We have here a theory of the origin of characters; viz., of the increased development or loss of parts as a result of use or disuse. We have also the theory that the peculiarities thus acquired are transmitted to the succeeding generation by inheritance.

The next formal statement of the efficient cause of organic evolution was presented by Messrs. Charles Darwin and Alfred R. Wallace in 1859.<sup>1</sup> The cause assigned is natural selection, and Mr. Darwin thus states what is meant by this expression in his work *The Origin of Species*.<sup>2</sup> "If under changing conditions of life organic beings present individual differences in almost any part of their structure, and this cannot be disputed; if there be, owing to their geometrical rate of increase, a severe struggle for life at some age, season, or year, and this certainly cannot be disputed; then considering the infinite complexity of the relations of all organic beings to each other and to their conditions of life, causing an infinite diversity of structure, constitution, and habits, to be advantageous to them, it would be a most extraordinary fact if no variations had ever occurred useful to each being's own welfare, in the same manner as so many variations have occurred useful to man. But if variations useful to any organic being ever do occur, assuredly individuals thus characterised will have the best chance of being preserved in the struggle for life; and from the strong principle of inheritance, these will tend to produce offspring similarly characterised. The principle of preservation, or the survival of the fittest, I have called natural selection. It leads to the improvement of each creature in relation to its organic and inorganic conditions of life; and consequently in most cases, to what must be regarded as an advance in organisation. Nevertheless, low and simple forms will long endure if well fitted for their simple conditions of life."

It is readily perceived that this statement makes no attempt to account for the origin of variations, but that it simply formulates,

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<sup>1</sup> *Proceedings of the Linnean Society of London.*

<sup>2</sup> Ed. 1872; p. 102.

as observed by Mr. Darwin, the doctrine of survival of such variations as are most useful to their possessors. This fact is more distinctly pointed out in the same work (p. 63) where the author remarks: "Several writers have misapprehended or objected to the term natural selection. Some have even imagined that natural selection induces variability, whereas it implies only the preservation of such variations as arise and are beneficial to the being under its conditions of life. No one objects to agriculturists speaking of the potent effects of man's selection, and in this case the individual differences given by nature, which man for some object selects, must of necessity first occur." It is evident then that Mr. Darwin did not attempt to account for the origin of variations, but that the service rendered by him and by Mr. Wallace to the doctrine of evolution consists in the demonstration of the reality of natural selection. Darwin also assumes in the statement first quoted above, the inheritance of acquired characters.

In 1865 the *Principles of Biology* of Herbert Spencer appeared. In this work the attempt is made to set forth the laws of organic evolution, in a way which represents an advance beyond the positions of his predecessors. He adopts and harmonises both the Lamarckian and Darwinian doctrines, and is at times more specific in his application of Lamarck's doctrine of the stimulus of the environment, and of use, than was Lamarck himself. Very often, however, Spencer contents himself with generalities; or takes refuge in the "instability of the homogeneous," as an efficient cause. This phrase, however, like his other one, "the unknowable," is but a makeshift of temporary ignorance, and is neglected by Spencer himself, when he can see his way through it. He approaches the cause of the varied forms of leaves of plants in this language:<sup>1</sup> "And it will also be remembered that these equalities and inequalities of development correspond with the equalities and inequalities in the incidence of forces." Language of similar significant but rather indefinite import is frequently used throughout this volume.

But in some cases Spencer is more specific. With reference to

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<sup>1</sup> *The Principles of Biology*, by Herbert Spencer, Amer. Ed., 1873, II., p. 143.

the inequality in the basal lobes of the erect leaves of *Tilia* and other plants, he says:<sup>1</sup> "A considerable deviation from bilateral symmetry may be seen in a leaf which habitually so carries itself that the half on the one side of the midrib is more shaded than the other half. The drooping branches of the lime show us leaves so arranged and so modified. On examining their attitudes and their relations one to another, it will be found that each leaf is so inclined that the half of it next the shoot grows over the shoot and gets plenty of light; while the other half so hangs down that it comes a good deal into the shade of the preceding leaf. The result is that having learned which fall into these positions, the species profits by a large development of the exposed halves; and by survival of the fittest acting along with the direct effect of extra exposure, this modification becomes established." In his discussion of the origin of the characters of animals, Spencer is also sometimes specific. Respecting the development of muscular insertions he remarks:<sup>2</sup> "Anatomists easily discriminate between the bones of a strong man and those of a weak man by the greater development of those ridges and crests to which the muscles are attached; and naturalists on comparing the remains of domesticated animals with those of wild animals of the same species, find kindred differences. The first of these facts shows unmistakably the immediate effect of function on structure, and, by obvious alliance with it, the second may be held to do the same, both implying that the deposit of dense substance capable of great resistance habitually takes place at points where the tension is excessive." Quite as specific is his ascription of the forms of epithelial cells to definite causes, as follows:<sup>3</sup> "Just the equalities and inequalities of dimensions among aggregated cells, are here caused by the equalities and inequalities among their mutual pressures in different directions; so, though less manifestly, the equalities and inequalities of dimensions among other aggregated cells, are caused by the equalities and inequalities of the osmotic,

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<sup>1</sup> *Op. cit.*, p. 143.

<sup>2</sup> *Loc. cit.*, p. 200.

<sup>3</sup> *Op. cit.*, p. 260.

chemical, thermal, and other forces besides the mechanical, to which their different positions subject them."

In spite of this not infrequent definiteness, Mr. Spencer occasionally falls into the error of ascribing the origin of structures to natural selection, as in the case of the forms of flowers,<sup>1</sup> and the armor-plates of paleozoic fishes.<sup>2</sup> Spencer assumes the inheritance of acquired characters throughout.

In 1866 Haeckel's *Schöpfungsgeschichte* appeared. In this work the author presents a mass of evidence which sustains the doctrine of evolution, and he combines the views of Lamarck and Darwin into a general system. He says:<sup>3</sup> "We should, on account of the grand proofs just enumerated, have to adopt Lamarck's theory of descent for the explanation of biological phenomena, even if we did not possess Darwin's theory of selection. The one is so completely and directly proved by the other, and established by mechanical causes, that there remains nothing to be desired. The laws of inheritance and adaptation are universally acknowledged physiological facts, the former traceable to propagation, the latter to the nutrition of organisms." Apart from the statement that adaptation is traceable "to the nutrition of organisms," we find nothing in Haeckel's earlier writings which attempts the explanation of the origin of variations, beyond the general position assumed by Lamarck. The distinctive merit of Haeckel is his formulation of phylogeny. Much of this was speculative at the time he wrote, but so far as the Vertebrata are concerned, it has been largely confirmed by subsequent discovery.

Up to this period, the form in which the doctrine of evolution had been presented, was general in its application; that is, without exact reference to the structural definitions of natural taxonomic groups. No attempt was made to show the modes of the origin of any particular class, order, or genus, and only in the most general way in the case of a few species, by Mr. Darwin. Phylogeny was untried, except by Haeckel; and this distinguished author did not

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<sup>1</sup> *Op. cit.*, p. 153.

<sup>2</sup> *Op. cit.*, p. 288.

<sup>3</sup> *The History of Creation*, Amer. Ed., II., p. 355.

attempt to account specifically for the origins of the divisions whose filiations he set forth.

In the year in which Haeckel's work above cited appeared, Professor Hyatt of Boston and myself took the first step towards the formulisation of a rational theory of the origin of variation, which should accord with specific examples of taxonomy. Quite independently, we selected the simple series presented by the characters of genera in their natural relations, Hyatt in the cephalopodous Mollusca, and I in the Batrachia Salientia. It is probable that Hyatt's<sup>1</sup> article was published shortly before mine. He says of the genera of Cephalopoda: "In other words, there is an increasing concentration of the adult characteristics in the young of higher species and a consequent displacement of other embryonic features which had themselves also previously belonged to the adult period of still lower forms." My own language is:<sup>2</sup> "That the presence, rudimental condition, or absence of a given generic character can be accounted for on the hypothesis of a greater rapidity of development in the individuals of the species of the extreme type, such stimulus being more and more vigorous in the individuals of the types as we advance towards the same, or by a reversed impulse<sup>3</sup> of development, where the extreme is characterised by absence or 'mutilation' of characters." The phenomena of the aggregation of characters in progressive evolution, and the loss of characters in retrogressive evolution, were termed by me acceleration and retardation in an essay published in 1869.<sup>4</sup> In these papers by Professor Hyatt and myself is found the first attempt to show by concrete examples of natural taxonomy, that the variations that result in evolution are not multifarious or promiscuous, but definite and direct, contrary to the method which seeks no origin for variations other than natural selection. In other words, these publications constitute the first

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<sup>1</sup> *Memoirs Boston Society Natural History*, 1866, p. 193.

<sup>2</sup> *Transactions American Philosophical Society*, 1856, p. 393; reprinted in *The Origin of the Fittest*, p. 92.

<sup>3</sup> The expression "reversed" is unfortunate, *diminished* being the proper word to convey the meaning intended.

<sup>4</sup> *The Origin of Genera*, Philadelphia, 1869.

essays in systematic evolution that appeared. To the explanation of the relations discovered by this research I applied the Lamarckian doctrine of use (or motion) and disuse, and added to that doctrine the effects on animal movements which result from the mental state called effort, in 1871.<sup>1</sup> This constitutes the earliest attempt, so far as I am aware, to demonstrate the influence of mind on organic evolution. Since that period my discoveries in the phylogeny of the Vertebrata through paleontologic investigations in North America have enabled me to present rational explanations for the origin and evolution of a number of particular groups.<sup>2</sup> Important contributions to corresponding histories of the Mollusca have been made by Hyatt,<sup>3</sup> Dall,<sup>4</sup> Jackson,<sup>5</sup> and Beecher.<sup>6</sup> Many other contributions, into which the paleontologic evidence does not enter, have also been made by various authors in Europe and America.

The authors quoted up to this point had all assumed that the progress of evolution depends on the inheritance by the offspring of new characters acquired by the parent, and had believed that such is the fact in ordinary experience. In 1883, Weismann, in an essay on heredity, announced the opinion that characters acquired by the body could not be transmitted to the reproductive cells, and could not therefore be inherited. This doctrine rests on the relation of the germ-cells to those of the rest of the body, which is expressed in the following language of his predecessor Jaeger: "Through a great series of generations the germinal protoplasm retains its specific properties, dividing in every reproduction into an ontogenetic portion and a phylogenetic portion, which is reserved to form the repro-

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<sup>1</sup> "The Method of Creation," *Proceeds. Amer. Philos. Soc.*, 1871, December; *Origin of the Fittest*, 1887, p. 173.

<sup>2</sup> "The Origin of the Hard Parts of Mammalia," *American Journal of Morphology*, 1889, p. 137.

<sup>3</sup> "The Genesis of the Arietidae," *Memoirs Mus. Compar. Zoölogy*, Cambridge, Mass., 1889, XVI., No. 3.

<sup>4</sup> Dall, W. H., "The Hinge of Pelecypods and Its Development," *Amer. Jour. Sci. Arts*, 1889, XXXVIII., p. 445.

<sup>5</sup> Jackson, R. T., "Phylogeny of the Pelecypoda, the Aviculidae, and Their Allies," *Memoirs Boston Soc. Nat. Hist.*, 1890, IV., p. 277.

<sup>6</sup> *American Journ. Sci. Arts*, 1893.

ductive material of the mature offspring. This reservation of the phylogenetic material I described as the continuity of the germ-protoplasm. . . . Encapsuled in the ontogenetic material the phylogenetic protoplasm is sheltered from external influences, and retains its specific and embryonic characters." In other words, the reproductive cells are removed from the influence of those stimuli which affect and effect growth in the cells of the other parts of the body, so that no character acquired by the rest of the body can be inherited. The bearing of this theory on evolution is thus stated by Weismann:<sup>1</sup> "The origin of hereditary individual variations cannot indeed be found in the higher organisms, the metazoa and metaphyta, but is to be sought for in the lowest, the unicellular." "The formation of new species, which among the lower protozoa could be achieved without amphigony (sexual union), could only be attained by means of this process in the metazoa and metaphyta. It was only in this way that hereditary individual differences could arise and persist." In other words, variation in organic beings above the unicellular forms, has been and is, introduced only by sexual reproduction.

The conclusions of Weismann were derived principally from embryologic research, and his disciples have been chiefly recruited from embryologists. These conclusions have been supported by extensive and exhaustive investigations, which have added greatly to our knowledge of the subject. In order to account for the appearance of characters in the embryonic succession, through influences confined to the germ-plasma, Weismann invented a theory which requires the presence of distinct molecular aggregates within it, which represent the potentialities or causes. To these he has given the names of ids, idants, determinants, etc.

Weismann has, however, subsequently modified his views to a considerable extent. He has always admitted the doctrine of Lamarck to be applicable to the evolution of the types of unicellular organisms. His experiments on the effect of temperature on the production of changes of color in butterflies, showed that such

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<sup>1</sup> *Essays*, p. 296. For a complete account of Weismann's views, see *The Germ-Plasm*, 1893.

changes were not only effected, but were sometimes inherited. This he endeavors to explain as follows.<sup>1</sup> "Many climatic variations may be due wholly or in part, to the simultaneous variation of corresponding determinants in some parts of the soma and in the germ-plasm of the reproductive cells." This is an admission of the doctrine which in 1890 I called Diplogenesis.<sup>2</sup> It appears to have been first propounded by Galton in 1875.

From what has preceded, two distinct lines of thought explanatory of the fact of organic evolution may be discerned. In one of these the variations of organisms which constitute progressive and regressive evolution appear fortuitously, and those which are beneficial survive by natural selection, while those which are not so, disappear. Characters both beneficial and useless or harmless, which are acquired by the adult organism, are not transmitted to the young, so that no education in habit or structure acquired by the adult, has any influence in altering the course of evolution. This is the doctrine of Preformation. From this point of view the cause of the variation of organisms has yet to be discovered.

The other point of view sees in variation the direct result of stimuli from within and without the organism; and holds that evolution consists of the inheritance of such variations and the survival of the fit through natural selection. This is the doctrine of Epigenesis. To this I would add that in so far as sensations or states of consciousness are present, they constitute a factor in the process, since they enable an organism to modify or change its stimuli. The position of each of these schools on each of the questions to which reference has been made, may be placed in opposition as follows:

1. Variations appear in definite directions.

2. Variations are caused by the interaction of the organic being and its environment.

3. Acquired variations may be inherited.

1. Variations are promiscuous or multifarious.

2. Variations are "congenital" or are caused by mingling of male and female germ-plasmas.

3. Acquired variations cannot be inherited.

<sup>1</sup> *The Germ-Plasm*, Contemporary Science Series, 1893, p. 406.

<sup>2</sup> *American Naturalist*, December, 1889; published in 1890.

4. Variations survive directly as they are adapted to changing environments. (Natural selection.)

5. Movements of the organism are caused or directed by sensation and other conscious states.

6. Habitual movements are derived from conscious experience.

7. The rational mind is developed by experience, through memory and classification.

4. Variations survive directly as they are adapted to changing environments. (Natural selection.)

5. Movements of organism are not caused by sensation or conscious states, but are a survival through natural selection from multifarious movements.

6. Habitual movements are produced by natural selection.

7. The rational mind is developed by natural selection from multifarious mental activities.

It is not my object to present the available evidence on both sides of each of the questions above enumerated, for I must here be satisfied with having formulated the problem. I shall treat the subject at full length in a forthcoming book, in which I propose to submit certain facts, in support of the doctrines contained in the left-hand column of the above table. My aim will be to show in the first place, that variations of character are the effect of physical causes; and second, that such variations are inherited. The facts adduced in support of these propositions will be necessarily principally drawn from my own studies in the anatomy, ontology, and paleontology of the Vertebrata. It will be my aim, moreover, to co ordinate the facts of evolution with those of systematic biology, so that the result may be as clearly presented as possible. The failure to do this by the founders of evolutionary doctrine has given their work a lack of precision, which has been felt by systematic biologists. The detailed application of the principles of Lamarck and Darwin has been the work of their successors, and has necessarily thrown much new light on the principles themselves. We have at present ampler means than ever to consider the validity of the general propositions on which the doctrine of evolution rests.

E. D. COPE.

PHILADELPHIA, PA.

# THE SCIENCE OF MENTATION

AND

## SOME NEW GENERAL METHODS OF PSYCHOLOGIC RESEARCH.

**B**Y mentation I mean the totality of the conscious and subconscious adaptive functionings of a living organism.

Bio-psychology is that department of the science of mentation which studies organic structures and their environments in order to determine the relations which exist between these and the mentations which accompany them. It studies such structures and environments which nature provides, and so far its method is that of observation; but it also artificially varies organic structures and environments, and to that extent its method is experimental. As experimental bio-psychology, it varies structure to determine function; and its scope includes three great sciences:

1. *Biologic Psychology*, which is that department of the science of mentation wherein our knowledge of mind is obtained by a scientific study of (A) organisms and their anatomical and molecular structures as exhibited by nature, and as varied by definite experimental conditions artificially produced; and by a study of (B) the cosmic environment of such organisms as exhibited in nature, and as varied by definite experimental conditions; and also by a study of (C) the mentations of organisms as exhibited in nature in environments that have not been artificially disturbed, and as exhibited under the definite experimental conditions of organism and environment before mentioned. In other words, this science studies the individual organism as *one* factor in producing mentation of a defi-

nite kind; and the cosmic environment as a *second* and (at least) equally important factor in the production of that mentation in a particular organism and environment; and the mentation as the *third* factor. Annihilate the second factor and the third would be impossible. Mentation is a product of the interaction of the individual organism and the cosmos of which the organism is a functional part.

The conception of this science which this classification promulgates demands a more exhaustive study of the organism (*a*) as part of the totality of organic life upon earth, and (*b*) as an individual whole, and of its (*c*) anatomical and (*d*) molecular constitution. It demands what is almost a new feature in biology and psychology, namely, a systematic study of the environment of an organism, and the co-ordination of such data with the data derived from the study of organic structures and the mentations of organisms. The adaptive activities of organisms and organic parts must be co-ordinated with the conditions of the environment. This department of research seeks to discover the laws of mind by observing the modifications of mentation which occur when organic structures and their cosmic environments are varied either artificially or naturally. It includes within its province, as one of its subordinate departments, what has hitherto been called "physiological psychology," and most of "psycho-physics." Biologic psychology, is, of course, physiological, but it is also anatomical, climatological, pathological, chemical, morphological, physical, geographical, zoölogical, botanical, paleontological, etc. The word "biological" is intended to be more comprehensive than the word "physiological" according to its usual significance, but it is to be distinctly understood that in keeping with the best modern thought *all* of the activities of an organism come within the province of physiology. The term physiological psychology does not sufficiently indicate the fact that in studying mind we must study cosmic environment, anatomy, morphology, organic physics, bacteriology, geographical distribution, and all the phenomena of organic life in direct relation to mentative phenomena.

Every structural or morphological difference is accompanied by a difference in function; and even in the same macroscopic and mi-

croscopic anatomy there is a further variation of function with every difference of a chemical and quantitative kind. By a study of all organisms with their molecular and molar structural differences throughout the entire scale of organic life; and by a study of the environments in which given organisms are found; and by a study of the particular mentations which occur in given organisms in given environments, we obtain a knowledge of mind as related to structures and environments of the kind which we have studied; and in so far as we may be able correctly to generalise, we may obtain a knowledge of the laws of mind which must characterise mentation everywhere and everywhen.

*Observational* biological psychology observes the organisms which nature has furnished, and *as* they are furnished. It is familiar only with such organisms and environments as it finds. Nature does the experimenting. Nature varies environment and evolves organisms, and the organisms exhibit certain phenomena in certain environments—we inventory what we see, and from a course of scientific thought about the data we arrive at generalisations concerning mind. The kinds of organisms and structural variations which we might wish to see in order to have certain questions answered we do not always find. Whole geologic eras have not furnished such environmental changes as would settle certain doubts and answer certain questions I have in my mind—but I can in a short time create such conditions of environment, and by doing so I enter the domain of experimental biological psychology. Nature does indeed make variations innumerable, both in structure and environment, but seldom does she make that particular variation which the student may happen to need to complete the investigation on hand—she pays no attention to the logical needs of our researches when she evolves organisms. But, accepting nature as we find her, and observing what she offers, we may make progress in knowledge of mind if we properly direct and organise our observation.

*Experimental* biological psychology does not depend upon nature alone to furnish for our study the incidents and phenomena of organisms and their environments, but regulates natural things in such a manner as to “artificially” produce such phenomena as

may be desired, or rather such classes of phenomena as may be necessary to give continuity to a systematic investigation of a given subject. In observational biologic psychology we simply observe what happens without our interference; in experimental biologic psychology we also practice observation, but we do something more, namely, we artificially vary the organic structures and environments and observe the concomitant variations of mentations.

In this domain the new method of research was definitely initiated by my experiments in the artificial transformation of lower organisms<sup>1</sup> by artificially regulated selective propagation in order to determine the precise mentative variations which accompany the evolutionary rise of given structural variations.

This method enables the experimentalist to vary and alter the structures of an organism without vivisections and mutilations, which latter methods give, not normal functional results, but pathological conditions. But to place organisms in a circumscribed environment whose conditions can be regulated and maintained, and selectively propagate them with reference to the development of some structural characteristic, *gradually augmenting* the specific conditions of the environment which demand the excessive development of that selected characteristic until all the individuals of a multitude succumb except the few able to survive; again propagating a multitude under more severe conditions and then suddenly increasing the specific condition to which they must become adapted, until all but a few are killed, and so on, until the particular structural character has been enormously developed, enables the student to vary structures without vivisections and mutilations and to study the mentations as they arise, and thus arrive at a knowledge of the relations between structures and mentations.

The retrogression and gradual disappearance of a structural characteristic from an organism by this method also furnishes excellent data for the study of the mentations which normally accompany a given morphology and anatomy and metabolism. The con-

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<sup>1</sup> First account of which was given in a lecture to the Philosophical Society of Washington, May, 1894, in which I described the results obtained in artificially evolving and retrogressing the *Volvox globator*.

trast between a structure retrogressed, and the same highly evolved, brings into conspicuous notice the precise mentative peculiarities of a given structural condition.

The gradual differentiation of a structural characteristic into divergent lines of evolution and retrogression by the method of artificial transformation of organisms enables the student to witness the rise and concomitant modifications of the accompanying mentations.

This method enables the student to select any characteristic of an organism, whether anatomical or chemical, and by retrogressing or evolving it, accentuate its mentative characteristics.

This method brings into conspicuous notice the relation between specific environmental conditions and structural modifications on the one hand, and the relation between environmental conditions and mentative modifications on the other hand. Structure and environment react upon, and modify, mentation; and, as will be seen, under psychological biology, mentation reacts upon, and modifies, structure and environment. Action and reaction are equal and opposite.

2. *Subjective bio-psychology*, which is that department of the science of mentation whereby our knowledge of the mind is obtained by a study, not of the structural and mental phenomena of other organisms, but of the introspective phenomena of our own minds as we alone know them in our own consciousnesses. It makes a study of the introspections of organisms as recorded and experienced by those organisms themselves—and this almost entirely limits this science to the human race as subjects. The individuals of different races and nationalities and occupations and sexes and ages and pathological conditions make a record of their own subjective experiences of consciousness—and these records compared with the student's own introspections constitute some of the data of this science. Such a record when once collected will constitute a natural history of the human faculties. It needs much to be made. It must study also the introspections which accompany particular anatomical, chemical, geographic, climatological, dietetic, and other conditions to which the individual may be subjected. It must ob-

serve these as presented by nature, and as varied by artificial experimental conditions. It must study the relation between environment and introspective states, by artificially varying the environmental conditions and recording the concomitant mentative (introspective) changes. The different metabolisms of the system affect introspections; so do different attitudes, gestures, colors, sounds, temperatures, humidities, electrostatic conditions of objects and the atmosphere, altitudes, smells, tastes, touches, movements, and so on, *ad infinitum*. In brief, this science inventories introspections, and finds out what kinds and degrees and successions of introspective states accompany certain anatomical and chemical conditions of the organism and certain conditions of the environment. The new method of experiment consists in artificially varying organic and environmental conditions and observing the concomitant variations in the introspective states of the student.

3. *Sociological psychology* is that part of the science of mentation which arrives at a knowledge of mind by studying the social organism of animal life as a whole, and of each species of animal and plant in particular, so as to obtain scientific knowledge of the social or group-anatomy of societies of individuals of the same or different species, and of the relation of these individuals to the whole social organism (social chemistry). It studies these phenomena as presented by nature and as varied by definite experimental conditions artificially produced. It also studies the environmental conditions of such social groups as exhibited by nature, and as varied by experimental conditions. It varies by the method of artificial transformations of organisms the social whole of a species, so as to produce new social structures and new environments, and correlates the data thus obtained from social anatomies and environments with the concomitant mentative phenomena. This science considers groups of individuals as anatomical wholes, and its new method of research consists in artificially transforming these social wholes and their environments and studying the concomitant mentations. It studies groups in their normal and abnormal conditions. It varies social structure to determine social function, or group-mentation. The social unit is one factor; the cosmic environment is

the second factor; and the third factor is the social, or institutional, mentation which results. Societies of *zoöglœa*, and groups of plants, constitute the material of this science, just as well as groups of the genus *Homo*.

I call especial attention to the fact that these three sciences constitute three distinct spheres of experimental research by three different methods, both of observation and experiment, and that from three distinct standpoints we thus obtain a knowledge of mentation. I would also call attention to the three new methods of experimental research, and how they clearly outline the scope and method of bio-psychology.

These three sciences of bio-psychology study mentation from the standpoint of *structure* to determine concomitant *function*. The structures of organisms are studied to determine (1) mentations as observable adaptive phenomena, (2) to determine introspections as known to the student, and (3) to determine mentations as part of a social whole of which the individual forms a part. It studies structure as correlated with the mentations of species of organisms, and as correlated with individual introspections, and as correlated with social mentative phenomena; and studies the structure of social wholes as composed of individuals. Structure is studied (as varied by nature or experimentally) to determine the corresponding kinds of functioning, and the quantitative relations between structure and mentation, in terms of physics and chemistry. It must be remembered that whatever mind may be, it cannot manifest apart from structure, and according to the degree of adaptability of the structure mind manifests. The thought of man cannot occur in the brain of a frog, and for higher mentation to occur in a given brain, a higher order of structures must exist. Remove from a human or animal brain any portion of the cerebral cortex and you remove a certain class of memories, and a certain kind of mental capacity disappears. Structures react upon mentation and modify it,—mind embodies in structures.

Having described the bio-psychological sciences, I will now still more briefly define the psycho-biological sciences. The three psycho-biological sciences study organisms from the standpoint of men-

tation—they study function in order to determine structure. Biology becomes a psychological subject. Mind is studied in order to find out what organisms are. In the bio-psychological sciences organisms are studied to find out what mind is. If we had no experience with organisms we would know nothing about mind. If we had no experience with mind we would know nothing about organisms.

Psycho-biology studies structures from the standpoint of mind, and interprets organic and cosmic phenomena in psychologic terms. This is the true basis of research. It is the mind that interprets phenomena. It is the mind that creates all sciences and institutions. The mind must have experience with itself before it can have experience with anything that is not itself. From the standpoint of consciousness we survey and know the not-self, and only in terms of mind can we know and define anything.

The psychological sciences study mind as varied by nature, and as varied artificially, in order to determine the corresponding structures and environmental conditions, and to interpret them in psychic terms; and to formulate the quantitative relations between mind and its embodiment in organic structure; and between mind and the environment of its embodiment. These three sciences are:

4. *Psychologic biology*,—which, in its subject-matter, method, and standpoint, is the exact opposite of biologic psychology,—studies the different kinds of minds and the different kinds of mentations in each given mind, to determine the nature and significance of organisms and environments. The purpose of research in this domain is not to find out directly what mind is, but from ascertained mental data and from psychic experiment to learn what organisms are, and what the different conditions of environment signify. Organisms are classified, not primarily according to genesis, or morphology, or distribution, but according to mental characteristics. Biologic classification and taxonomy becomes psychologic. Organisms, being mind-embodiments, their taxonomy is based upon the kind and degree of mind which has been embodied. The mentation is the basis of classification. Organisms are interesting in this domain because of the way in which they have structurally embodied a given amount of mind in any class of mental functioning.

Psychologic biology studies the anatomy of minds, and the elements of conscious and subconscious mentations as presented by nature and as varied by definite experimental conditions, and determines the concomitant conditions of environment and of organic structure.

The new method of research in this realm consists in varying artificially the mentation of an organism and studying the structural changes produced by these varied mentations in that organism and in the environment. Functioning creates and precedes structure. The organism is caused to engage in special kinds of mentation, and is induced to exercise those special kinds of mental functioning to an unusual degree and for a long time, and then its cerebral and subcerebral structures are histologically and chemically compared with those of an organism of the same age and species which has been deprived of the opportunity to exercise those particular mental faculties, and thus can be determined the exact relations between organic structure and metabolism on the one hand, and mentation on the other hand. This new method of research is of greater importance, perhaps, than any of the others. Out of it grows an art of brain-building or mind-embodiment, and other important scientific and practical results. It places psychology upon an experimental basis that enables us to determine functional localisation of mental faculties and quantitative relations between mentation and structure.

Great advancements in knowledge are ever associated with new methods of research and new technic. The history of our knowledge of histology amply illustrates this. Out of the new method which characterises this branch of the science of mentation many important results have been obtained, both to science and art, and as yet the possibilities of the method have hardly been inaugurated.

To restate the method more elaborately, it may be described as follows: It consists in depriving an animal from birth until death of some one definite kind of mental activity, and then comparing its cortical structures and cortical chemistry with that of another animal of like age and species which has not thus been deprived of the using of that function of the mind, and noting the structural differ-

ences between the two. Of course, important results are obtained by examining also the sub-cerebral ganglia and other nervous tissues, and even any and all organs of the body down to the changes in individual muscular fibres. This enables one to determine the structural relations between a given mental activity and brain-development when that activity has been normally exercised and when it has not been exercised. The same method is extended and made more instructive when both of the animals just mentioned are compared with an animal of like age and species to which has been given an extraordinary development of that same definite mental function by causing it to excessively exercise that same faculty of which the first-mentioned animal was deprived. One result of these two ways of applying the method of research is, that it illustrates forcibly the fact that an unused faculty leaves some part of the brain deficient in those psychic structures which are to be found in that part of the brain of an animal which has used that faculty; that wrong use of a faculty develops abnormal structures in that part of the brain where that function has been structurally embodied; and that extraordinary use of any one mental function creates in the corresponding part of the brain an extraordinary development of cortical structures in which that extraordinary mental faculty is embodied. It proves that more brains can be given to an individual than it would otherwise, by any natural development, have possessed.

In one series of experiments seven shepherd puppies were confined in a completely darkened room from the moment of birth until they were nine months old. Triple doors guarded the darkness of the room in which the puppies were confined. This permitted the mother to go in and out without allowing light to enter the room. The front doors were opened, and when the mother entered the hall-way the doors were closed behind her, and she was allowed to remain there some minutes until the phosphorescence had subsided, and then she was admitted into the second compartment and the doors closed behind her. After a few minutes she was admitted into the room where her children were. Thus for nine long months these puppies were deprived of light. They were then chloroformed,

and their brains, spinal cords, and other ganglia, were prepared and preserved for microscopic and chemical examination. Their eyes were also preserved. A second group of shepherd puppies of the same age were allowed to lead a usual life normal to the average dog, and without deprivation or special training of the seeing function. At nine months they also were chloroformed, and preserved for examination. A third group of the same kind of puppies were subjected to a prolonged training of the seeing functions. The hall leading into one room of my laboratory was covered with squares of metal, each square insulated from the others, and colored. These squares of metal were connected with an induction coil, with the exception of those of a certain color which were not thus connected. It was so arranged that a dog might jump from one square to another of the same color and thus pass through the entire length of the hall without getting an electric shock. To do this the dog had to discriminate between that color and all the other colors tinted upon the metal squares. An attentive dog after having been shown several times would learn to avoid the slight shock which he would invariably get when he stepped upon the wrong color. This enabled me to know whether the dog actually discriminated between given colors, and also enabled me to compel him to practise this discriminating between colors several times daily for five months. I was thus able to determine whether the dog actually saw all of the colors, and to exercise him in the function of seeing the colors and discriminating between them. It enabled me to compel other dogs to see only certain colors and to discriminate between certain colors only, and thus determine the functional localisation of color-functions. It enabled me to cause the dogs to associatively integrate their color-memories with definite motor-memories from the movements necessary to avoid getting shocks from certain colors on going through the hall.

I varied this device somewhat by feeding the dogs from under inverted pans which they were compelled to turn over in order to get a mouthful of meat that had been previously placed under them. All of the pans were rubbed with meat to prevent the dogs from selecting those with meat under them by the sense of smell. Meat

then having been placed under, say the yellow pans only, the dog was shown where to get his breakfast. For several weeks they would indiscriminately turn over all the pans without reference to color. By and by they would gradually hunt out the yellow pans more frequently than those of another color, and after about six weeks of practice (being then five months old) some of them would turn over only yellow pans. Then the meat was placed under a differently colored pans until the dog had again learned his lesson, and so on, until finally several dogs were able to discriminate between seven shades of red (not purple and red), several greens, and so on. One dog learned to examine all of the pans as he came to them until he found meat, and after that he would turn over only pans of that color—he had made a generalisation, had reasoned from phenomena to a principle applicable to his daily life.

The brains of these three groups of dogs were examined and the following general results were established :

The group which had been deprived of the use of the seeing-function exhibited an undeveloped cortex in the occipital seeing areas; the second group which had been allowed to lead a usual life had a more highly developed cortex in this same region—it was thicker, more vascular with arteries, veins, and lymph-channels, was more grey, and had a greater number of brain-cells. The former group could not be said to have brain-cells in the seeing-areas, so undeveloped and few were they; whilst the second group had well developed brain-cells in the usual number (for a dog). The brains of the third group had a much more highly developed cortex than the second group, it was more grey, thicker, far more vascular, and had a much greater number of brain-cells, and the brain-cells were far more highly developed. These experiments made upon many other dogs besides these mentioned, and upon other animals, fully confirm these results. In all cases deprivation of a mental function was accompanied with a lack of structural development in the corresponding part of the brain, and excessive training of that function was ever accompanied with extraordinary development of the special structural elements of that part of the cortex. Thus in the three groups of dogs just described there were ample evidences of

brain-structure actually having been builded in the brains by the special training, and also of lack of usual development having been produced by deprivation of the opportunity to use a mental function.

Referring to the three groups of dogs first mentioned it is interesting to note that the vasculature was least in those that had been deprived of light, greater in the usual dog, and by far the greatest in the specially sight-educated dog, thus indicating greater activity in those areas in the educated dogs. The greater amount of lymph-drainage shows that the blood-supply was used and transformed into structures whose functioning required food.

The specific gravity of the cortex was difficult to estimate, and it required delicate experimentation to approximate accuracy in the matter. Obviously the density of the grey matter is quite a different thing from the density of the cortex, because the cortex as a whole is filled with veins, arteries, lymph-vessels, etc. In order to determine the specific gravity of the grey matter a small portion was microscopically isolated from vascular tissue and immersed in liquids of different densities until it remained stationary in the liquid and just submerged a short distance from the viscous surface of the liquid. In order to facilitate the attainment of the position of equilibrium of density the liquid was subjected to sound-oscillations of high pitches, which caused the small mass of grey matter to move into the truer position or degree of submergence. By this method the density of the grey matter of the cortex of the seeing-areas of the dogs deprived of light was (on the average) 1.011; in the second group of dogs it was higher: 1.018; and highest in the third: 1.027. In experimenting with the hearing, and with the leg-movements of dogs I confirmed these results with the other senses.

In the first group of dogs in the seeing-areas I could find only undeveloped neuroblasts without collateral filaments and plumose panicles; in the second group there was on the average eighty-nine moderately well developed ganglion-cells per square millimetre section, and the axis-cylinders, plumose-panicles, and collateral filaments were observed in moderate number and moderate development. Whilst in the third or educated group there were from one

hundred and four cells upward per square millimetre section of the cortex, and these cells were far more complexly developed in their interior structure than in the second group, had more plumose panicles and collateral filaments and these were more complex than in the usual dog, and in many ways the seeing-areas of the trained dogs were at least twenty-five times (an approximate, but low estimate) more complex structurally than in the usual dog.

It was impossible to completely deprive animals from the opportunity to hear sounds, but by depriving them as much as possible, and contrasting them with another group that had been made to practise hearing and discriminating sounds, it was found that the cortex in the hearing-areas of the trained dogs was more vascular, had a higher specific gravity, was thicker, and contained far more brain-cells, etc., than the cortex of those which had been partially deprived of sounds, and far more than the cortex of any usual dog. Experiments upon the senses of smell and taste confirmed the same results. Rabbits confined in monochromatic rooms, and thus compelled to see only one color of light from birth until death exhibited a chemically different cortex over the seeing-areas than rabbits which had been subjected to a different color—the cortices would stain differently with the same reagent.

I may mention here that I employed new technic in these examinations. My staining was done by cataphoresis, that is, the electric current was employed to carry chemicals into the tissues. The staining agent is carried into the brain-substance to be examined by the aid of the current from batteries, thus staining differently than when the reagent is used in the usual way. I also sent one stain into the tissues in one direction and then sent another chemical through in the opposite direction—the two reacting upon each other produced some very delicate staining, revealing structures not capable of being seen by other methods.

Another sample of the new technic is as follows: from a prism a monochromatic ray is reflected upon the slide containing the tissue to be examined—tissue that has been hardened, cleared, and stained in any of the usual ways or by cataphoresis—and some of the structures may absorb and some reflect this ray. If not reflected ano-

ther ray of a different pitch is tried until some result is obtained. These monochromatic rays bring into visibility different portions of the tissue—what is revealed by one color may be invisible under another colored ray. By sending upon the first monochromatic ray another ray of a different color the different structures rendered visible by the two rays may often simultaneously be viewed.

I also caused a dog to practise certain things with his right leg, and another dog, with his left leg, and found in the first case an unusual development of the left Rolandic leg-area, and in the second case an unusual development of the right Rolandic leg-area. In a case where the dog used both legs equally there was equal development of the two areas. One dog was prevented from doing walking from birth till death, and his brain compared with that of a dog that had followed a huckster wagon day after day from the fifth to the twelfth month—the difference between the leg-motor areas was enormous in all of the characteristics mentioned in case of the sight-educated and sight-deprived dogs.

One group of three dogs were caused to practise leg-motions in response to certain sounds; and another group of two dogs were caused to practise the same leg-motions but in response to colors. The cortical peculiarity was in the first case an unusual development of the fibre-tract between the leg-areas and the hearing-areas; and in the second case the fibre-tract between the leg-areas and the sight-areas was unusually developed.

These and many similar experiments confirmed me in the conclusion that the *modus operandi* of mind and brain-growth is this: every conscious experience of sufficient intensity and duration creates in some part of the brain special structural changes, both of a histological and chemical kind, and that the re-functioning of those structures constitutes memory. These last-mentioned experiments upon the fibre-tracts confirmed me in the conclusion otherwise arrived at, that the association between memories is accomplished by anatomical integration by means of fibres and plumose panicles and wave-motions in the brain-mass.

Every definite mental experience produces a definite anatomical and molecular structure in some part of the nervous system.

Each definite emotion produces a characteristic metabolism, and a definite memory structure: the evil emotions produce *cacastates*, and the good and agreeable emotions produce *eunastates*,—the former are life-destroying and the latter are life-augmenting. Right and wrong has a chemical basis and criterion.

This method of research, the results which I have attained by it, and an account of some of its applications, will soon be published in a book which I now have well under way, and hence I will close my present account of the method of research in psychological biology by saying that this method can be very much extended, and it promises splendid results in the whole domain of psychology—using psychology as inclusive of biology and every other science. All sciences can be properly studied as products of mentation, and not in any other way. All arts are the product of mentation and are applied by mentation; and all skill and work is mentation. All knowledge is mentation, and all discovery is mentation. It is the mind that succeeds in scientific work—it is not so much a question of experiment, and of the phenomena observed, as of the mind that mentates the experiment and thinks about the phenomena; and in order to promote the development of a given science by a given mind it is infinitely more important to develop and properly *use that mind* than to experiment and observe. Experimenting, if properly done, is the most perfect kind of mentating, and the better the brain, the better the mentation.

Give to any group of animals of like age and species a definite training in the use of any one mental function (or group of functions), and to another similar group a definite training in some other one mental function (or group of functions), and then compare their brains, and learn the causative relation between mentation and structural growth—learn how it is that the phenomena called *life* are caused by mind. Compare the brains of the just-mentioned animals with the brains of other animals that have been deprived of the exercise of these same functions, and learn that in any part of the brain selected there can be builded structures according to a previously determined plan. *That* is brain-building. Future edu-

cational systems will be based upon brain-building, or mind-embodiment.

It is obvious that these structural changes can be made in any animal or human being in any part of the brain selected, or in reference to any function or group of functions, if these functionings are done taxically and systematically so as to uniformly reiterate each element of a complex group until the entire group has been embodied in structures, and to do this by presenting taxonomically related groups of experiences from each domain of nature and knowledge is to build a normal and efficient brain, whose functioning will surpass the mentation of a book-bred or school-drilled brain whose structures are ataxic and asymmetric.

The educational systems which will grow out of the principles of brain-building will leave no areas of the brain fallow, no cell-layers undeveloped, no departments of nature unstudied. The taxonomy of cosmos, and the natural relations of knowledges, and the natural laws of brain-growth will determine the subject-matter and method of coming school-curriculum. The given brain and mind of the pupil will become the guide for its own development, and subject-matter and method will be guided by the natural requirements of that mind. Not the text-book or the course of study will regulate the training, but the needs and nature of the particular brain of the pupil. Only by a study of the actual methods of brain-growth, as caused by mental activity creating brain-structures, can we hope to drop the present artificial and highly arbitrary educational customs and adopt a natural and normal method.

In this new method of research we have a direct way to ascertain the relations between mental action and mind-embodiment, and can thus obtain the unassailable data for the formulation of a natural and comprehensive education. One-sided trainings which leave some parts of the brain atrophied and others congested will be forever abandoned. Courses of instruction which pour into the mind disconnected elements of mentation from disconnected subjects and build up a partial, intellectual, atypic series of mind-embodiments without the complementary emotional embodiments will be abandoned. From all domains of nature and through every normal

channel of mentation will be exercised every class of mental activity in taxic groups, according to the brain-building laws, and the brain will be a harmoniously-working and efficient organism with all of its parts in due proportion, and evil memory-structures and immoral propensities fully eliminated. I call upon investigators everywhere to hasten to take advantage of these opportunities.

My appeal is that many workers may soon take up the scientific study of mentation and reap the rewards of these methods of research. The brain is the most wonderfully complex organism known to man, and it is a machine that can be used in the production of definite results, according to determinable and determined rules. The mind, by its own activity, can build and re-build this machine according to methods formulated out of the data offered by the method of psychologic research herein outlined. We know of mind only as manifested in the functioning of organic structures, and when we build a larger and better brain by the proper kind of taxic mental functioning we give to that person more mind.

Mentation is the directive and causative factor of organic evolution: and evolution is mind-embodiment. From the lowest to the highest organism, as the mind becomes more efficient and complex the brain-structures also become more complex. The goal of any evolutionary stage of any species of life is the degree of mind embodied. Can you conceive of progress which brings ever less and less mind? It follows that out of these researches grows not only a method of education, but a standard of conduct: that act which in its immediate or remote consequences causes the embodiment of more mind is right, wholly right, and there can be no other right; and that act which in its immediate and remote consequences causes less mind to be embodied is wrong, wholly wrong, and there can be no other wrong. This is not the place to discuss this proposition. Suffice it to say that by mind I mean the totality of adaptive functioning—I mean not merely intellectual acquisitions, but acquisitions of the corresponding emotive states and conative structures and the attainment of moral character—all of which are mental functionings. In these studies we are in the workshop of progress—we are studying the laws of the great motor of evolu-

tion—the cause and content of all knowledge and life—namely, mentation.

The modern age will not be known as the age of steam or the age of electricity, but the age of the apotheosis of mind; the age wherein the attention of mankind has been directed to the primary cause and fountain of all progress and power and suffering and happiness, namely, mind! The standpoint of science will be changed from that of a struggle with experiments and phenomena to a struggle with the mind that makes the experiments and observes the phenomena. There will not be less experimentation and observation, but more, and it will be by better minds. The arena upon which present science directs its undiverted eyes is that of objects and phenomena in the objective world, whilst the arena of the new standpoint is that of the pupil's own mind. Make a better brain and get a better mind and learn how to use it, and observation and experiment will teach something more to that mind than to the person who neglects the most important factor of any and all investigation—namely, the mind that makes it.

5. *Subjective psycho-biology* studies introspections as presented by nature and as varied by the pupil's own subjective efforts in order to learn what his or her own organism is. The new method of experimentation in this science consists in artificially varying introspective states and observing the effects of those definite and long-maintained states upon the organism and the environment. It requires a previous training in subjective bio-psychology so the pupil may be able to recognise and name and call into activity any given introspective state and maintain it for required lengths of time.

This method determines the relation between mental states and metabolisms and structures and environmental conditions. Each emotion produces a metabolism characteristic of that emotion, and every introspective state which the pupil can recognise and maintain, will, while thus maintained, produce definite structural effects and definite physiological and pathological results in the pupil's own organism which leads to formulation of the laws of organisms in the terms of mind. Introspective states affect metabolism, circulation, respiration, digestion, assimilation, excretion, secretion,

growth, sleep, wakefulness, strength, health, hearing, seeing, tasting, smelling, temperature and pressure senses, dreams, movements, complexion, voice, gesture, and the environment. The new method of scientific research in this domain, as before stated, consists in experimentally maintaining and suppressing introspections and studying the organic and environmental effects in order to formulate the laws of organisms, especially of the pupil's own organism—a knowledge that exceeds in importance that of all others to the pupil.

6. *Psychological sociology* studies the mental phenomena of groups of organisms or societies in order to determine *what* organisms are, and especially *what* groups of organisms are. It studies the mentations of groups of individuals and institutions and mobs and families and clans and sects and religions and social integrants as presented by nature and as varied experimentally in order to determine the effect of such group-mentations upon the individuals of the group, and upon the group, and upon the environment. It interprets social wholes in psychic terms.

The method of experimental research in this domain consists in artificially varying the mentations of groups of individuals and observing the corresponding changes in group-structure and in environment. From coherent masses of cells and groups of plants to human institutions the experimental scheme is to vary the adaptive functioning and observe and correlate the effect upon the group. Mind laws are applied to the study of societies in order to find out the laws of structure and environment in relation to groups.

These three psycho-biological sciences rest upon the discovery that by varying the mentation of an animal or group of animals we can vary the growth of visible, tangible, ponderable structures of an organism, and thus determine the causative connexion between mentation and living growth. Mind dawns before the view of the experimenter in this domain as a causative factor in life and evolution. If every action of an adaptive character is called mental, then the distinction between animate and inanimate masses or bodies, between living or "supposed" lifeless matter, is one of mind. If every adaptive action of an organism is mental, then mind is the efficient cause of evolution. If every adaptive act is the result of

sensibility or perception or volition or willing or impulse or desire or fear or craving, and so on, then it follows that adaptation is mental and evolution is mental. Our conception of an inanimate mass is that it cannot initiate an adaptive and responsive action. Our conception of an animate mass is one that can initiate an adaptive movement, molar or molecular (every molar motion being the result of a molecular motion in an organism).

The demonstration that mental activity creates structure places the matter of evolution largely in our hands to direct and augment it. We can select grouped activities according to the taxis of nature and mind, and build a grouped series of taxic structures in the brain, and thus embody more mind and thus anticipate centuries of haphazard, survival-of-the-fittest evolution, unaided. Henceforward man can take the Archimedean lever of progress in his own hands (or brains) by directly augmenting the fundamental cause of evolution and progress,—getting more mind, and learning how to utilise it. Mind is at once the cause and the end of progress—the method and the goal!

The chemist who desires to advance his science will spend less time and labor perfecting his apparatus and experiments, and far more time to the perfection of his mind as the instrument to use in making discoveries. The insight has changed from the objective to the subjective. It is a question not so much of the number of experiments he makes, and the number of compounds he studies, but of the amount of mind he has embodied and of the way he uses his mind thus embodied. By getting more mind through brain-building he will be able to understand phenomena and devise experiments before impossible to him. The centre of scientific effort will henceforward be the perfection and building of the scientist's own brain and the embodiment of more and better mind, with which to experiment and think.

7. The *Science of Mentation*, of which *psychology* as previously known is a subordinate department, is a synthesis of the generalisations of the preceding six experimental sciences, and proceeds upon such fundamental laws of mind as have been determined, and includes logic as portion of its subject-matter co-ordinate with all

other sciences as portions of the science of mentation. All philosophical and metaphysical systems, all religions, languages, and institutions and arts come within its scope, and furnish its subject-matter. Whatever the mind has done belongs to the science of mind. All that man has done upon earth, all that has resulted from the adaptive functionings of organisms, from the hole burrowed in the earth by the simplest worm to the pyramids of Egypt; from the silicious shell of a diatom to the Thirty-nine Articles; from the automatic metabolism of protoplasm to the prevision that results from the highest scientific generalisations; in short, all of the phenomena of life come directly within the scope of the science of mentation. All *knowledge*, having been produced by mind, and capable of being known only by mind, and can be applied as an art only by mind, comes under psychology as a subordinate branch. The science of mentation, which might be called psychonomy, offers data for an art of mentation. Corresponding to this mind-science there is a mind-art,—but of this I may speak in a subsequent article.

I will conclude by calling attention to the imperfections and complete inadequacies of all psychologic terminologies. So great is the diversity of meaning attached to all terms relating to mind that it is very difficult to make one's meaning clear to any great number of people, and it is even difficult to make a record of one's own thinking. The same word applies to such a number of distinct mental processes, and so many distinct mental functions have no name, that it is time to introduce some terminology free from these difficulties. In my own thinking and writing I use symbols instead of words, and the system has received the approval of some very high authorities. I append a brief description of part of this system of symbolic terminology, reserving a description of the taxonomic nomenclature for subsequent presentation.

Many cosmic forces may be incident upon the organism, but only those which excite an adaptive response, act as a stimulus: let such a cosmic stimulus be named or represented by the capital letter *A*.

This cosmic stimulus may be incident upon an organism but not be of sufficient intensity or duration to excite an adaptive re-

sponse, if so, it does not produce any impression recognised by the organism or responded to by any of its structural parts. But if of sufficient intensity and duration to produce such an impression upon any organ then it is called a sense-impression, and is represented by *B*.

Let the transformation of this sense-impression into transmissible energy be symbolised by *C*; and its transmission through a nerve by *D*; the impression made upon a ganglion by *E*; the transformative functioning in the ganglion by *F*; the libero-motor discharges from the ganglion by *G*; the new structures caused by the ganglionic functioning by *H*; the effect of the libero-motor discharge by *I*; the re-functioning of the *H*-structures by *J*; the libero-motor discharges of the re-functioning by *K*; the effects of *K* by *L*; the structures caused by the re-functioning of the *H*-structures by *M*; the libero-motor discharges of *M* by *N*.

This is not the full symbolism for the area gone over. Thus the libero-motor discharges of *G* are transmitted through a nerve, and in the full terminology this is named, so is the impression of that which is transmitted, and so is the effect on the tissue to which it is transmitted, and so on. My purpose is to give enough of the terminology to give an idea of its scope and importance.

Resuming again the system of naming from where I left off, let the transmission from the sense-organ or ganglion to other ganglia intermediate between the sense-organ and the cortex be represented by *O*, *O'*, *O''*, etc.; the transformation of the force for transmission by *P*; that which is transmitted by *Q*; the impression on the cortical cells by *R*; the functioning set up in these cells by *S*; the consciousness of that functioning by *T*; the structure formed by that functioning by *U*; the libero-motor discharges of that functioning by *V*; the effect of *V* by *W*; the refunctioning of *U* by *X*; the consciousness of that *U*-refunctioning by *Y*, and so on.

Special symbols indicate the kind of stimulus, whether of light, sound, smell, etc., and the higher grades of mentative integration and differentiation have symbols for names instead of words. This conduces to great exactness in description and in thinking. The functionings called sensation, imagination, conception, ideation,

reasoning, and so on, have each their appropriate symbology and taxonomy.

These new methods of research open wide fields of richest treasure to the investigator, and offer wonderful chances for co-operative mentation and research.

ELMER GATES.

PHILADELPHIA, PA.

## LITERARY CORRESPONDENCE.

### FRANCE.

Twenty years ago when M. le Comte d'Haussonville received M. Alexandre Dumas fils at the French Academy, the audience were surprised to find M. Dumas a trifle insignificant, in spite of his talents, and apparently unfortunate in having sought success in the criticism of the *Chimène* and *Rodrigue* of Corneille. The fine irony, the distinction of style, the justness of judgment displayed on this occasion, did not emanate from him. The man of the world, with his qualities of race and his experience of public affairs, won the victory over the professional writer in this pleasant academic bout.

Yesterday, again, the presentation of M. Albert Sorel afforded us a similar spectacle. At the outset a diplomat, M. Sorel is now a professor. To judge solely by his last discourse, philosophers will doubtless be of opinion that he is far from exhibiting the qualities which marked the work of M. Taine, his eminent predecessor. Besides, his rhetoric is a trifle apparent, and is redolent of the methods of the schools. With M. le duc de Broglie, it cannot be gainsaid, the judgments are more precise, the phrase is valued less for itself than for its substance. The language, both in the eulogy and in the criticism, is facile and measured. The statesman lifts us without effort to that elevated plane where, if it is not possible to grasp things individually under the best points of view, one at least obtains a better and more satisfactory survey of the whole. On this occasion again the statesman eclipsed the scholar, the man of the world the man of the study.

I could go back even to the *Correspondence* of Voltaire and

Frederick the Great, of which Sainte-Beuve remarked that of the two, Frederick showed not less *esprit* than Voltaire, while in many respects he was his superior. My object in these parallels is to depreciate neither literature nor scholarship. I am thinking merely, that we are too prone—at least in France—to restrict genius to, the province of letters, and to confine the human intellect to a narrow field of action, in which it does not always completely express itself. Words are not all, and even literature is a trumpery matter, when unleavened by the breath of life. There have been admirable writers who were not authors by profession. The rules of our French Academy, therefore, in spite of the strictures they have evoked, were wise in calling to its assembly-halls, statesmen, soldiers, and even noblemen, who have not made a business of wielding the pen. The Academy, in this way, wins qualities and a prestige which would otherwise be lacking to it. One may foresee, without difficulty, on reading the discourse of M. le duc de Broglie, all of whose opinions, however, I do not share, that none of our recent academicians—as M. Brunetière or M. Jules Lemaître—is ever likely to speak in his manner.

Can it be said, now, that M. Taine has been fully appraised in these two discourses? I hardly think so. M. Sorel has not successfully grasped him; he has displayed his dispersion only at the sacrifice of being dispersed himself. M. de Broglie has, beyond a doubt, comprehended him better, contrasting in the illustrious deceased the character of the artist with that of the philosopher, his imagination oftentimes extravagant, with his logic, which is often strained. It appears, in places, as if the figure of M. Taine emerged from these appreciations, diminished and dwarfed. His weakness, in my opinion, was an exaggerated anxiety about form, strengthened by his education at the Ecole Normale. He has given way more than once to the illusory ambition of accomplishing by words what was left unaccomplished by the thought and of illuminating by the light of words ideas without which the words are dark. I do not assert, of course, that the drapery does not conceal a robust body; I merely reproach him with a certain labored virtuosity, which does not always stand his philosophy in good stead. He abhorred the lan-

guage of Comte, one of his philosophical masters, and perhaps did not love overmuch that of M. Guizot, who evoked in him the inspiration of the historian. Both, however, left signal works, which it has not been his destiny to rival.

Taine was above all a psychologist. His cardinal doctrine must be sought for in his work *De l'Intelligence*, which is his chief performance. He has exercised by this book a decisive influence on the French school for twenty-five years. His error,—and others have followed him in it,—is in my judgment his seeking in psychology the key to history, and his believing it possible to reduce sociology to a study of individuals or even of races.

"Fundamentally," he wrote to me, in a letter in 1883, on the subject of an article which had appeared in the Review edited by M. Littré, "the historical school to which I belong has extensive analogies with the positivist school of which you seem to be an adherent. I say 'fundamentally,' because if we take the social and political theories of Comte our conclusions are opposed. He did not love the details of history, nor psychological criticism, and these, in my opinion, are our only means of penetrating into the inner recesses of souls, and of observing individual and collective passions, which are the real causes of events." Taine set great store by a richly-stocked palette in his portraiture of events by their actors; but he was debarred by just this procedure from all explanation of their movement and real concatenation. He raised an auxiliary method to the rank of a constructive method.

The reader will be kind enough not to take my remarks for aught else than a testimony of my profound regard for an eminent mind. Discussion magnifies the living, continues the dead. Concerning this nice point of historical method, on which I have just touched, I have expressed myself at length in my last *Correspondence*. The brief lines of Taine which I have extracted from my papers, appear to me to show forth with remarkable distinctness the motive principle of his literary, historical, and social criticism. We know what has been added to it since, by M. Tarde and M. Le Bon. But with all that has been done, it by no means follows, that the opposite method is dead—which consists in deducing from the study

of large historical *ensembles* (a study which does not at all exclude details or psychological criticism) general laws of evolution which will enable us to predict events and will secure a sure foundation for practice.

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M. EMILE DURKHEIM, who presides over the department of sociology in the Faculté des Lettres at Bordeaux, publishes *Les règles de la méthode sociologique*.<sup>1</sup> He takes a stand in this work in opposition rather to M. Tarde and the psychological school than to the positivist school. What he really aims at is the remodelling and completion of the work of Comte and Spencer. He agrees with Comte on the one essential point, that society is a *fact sui generis* which transcends biology. The object of social science is said to be that new "thing" which results from association and which assumes, therefore, the character of a system of action common to, and imposed upon, all the members of a society. It will be necessary in the future to study it from without, without regard for its repercussions in the consciousness of the individual, or for individual modes of thought.

This, M. Durkheim tells us, is what Comte sought after. But he did not remain loyal to his own method. He saw in society a course of individual development, and thus, in spite of himself, let psychology have the last say. We revert by this road to the common error of thinking that the facts of society have value only in and through our ideas, which would then constitute the proper matter of sociology. In fact, Comte did, adds M. Durkheim, make the idea of progress the object of his sociology, defining social evolution by the idea he himself had of it. Now, without contesting the empirical worth of the "law of the three stages," it is legitimate, runs his conclusion, to say that the sociologist is not called upon to busy himself, as Comte did, with the direction of evolution, but has merely to seek out the definite causal relationship between antecedent phenomena and consequent phenomena.

Certainly, it would be unjust to assert that neither Comte nor

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<sup>1</sup>F. Alcan, publisher.

Spencer had in view the explication of the present by the past. But in addition to Comte's limiting his attention to the study of the mental factor, he further committed, according to M. Durkheim, as Pascal did, the error of crowding humanity into a single line of growth, of representing progress as that of a single people, "to which all the consecutive modifications observed in diverse populations could be ideally referred." M. Durkheim has proposed, accordingly, as a means of avoiding this mistake, to discover what he calls *social species*, which shall serve as intermediary links between the confused multitude of historical societies and the simple but ideal concept of humanity. We should obtain, in such a way, if I understand the thought of the author, abstract morphological types, calculated to represent and symbolise the concrete types in all features that are essential; and by studying the concomitant variations of these types, in other words, by the employment of the comparative method, we should arrive at last at a scientific explanation of the phenomenon.

M. Durkheim has, in my judgment, entered on the only path that is likely to lead to the establishment of a sociology. The methods lauded by Taine and Tarde have proved incompetent. Not that M. Durkheim's thought is always clear, nor his exuberant dialectics without pitfalls. He gets entangled, for example, in the relations of "generality" with "normality," and in the pages where he treats of criminology he boggles at the explanation of a difficulty which is simply the outcome of his own definitions. He has reached a theory of the social utility of crime, a point on which M. Tarde will no doubt make short work of him. M. Durkheim might have spared himself these petty vexations, had he simply pointed out the causes which are calculated to augment criminality in a society in many respects apparently progressing, and had he avoided also attaching an absolute value to that rather lax expression, *inferior* or *superior* social types. He appears to have forgotten, in fine, that medical pathology affords an auxiliary discipline—as, for that matter, all psychology does—which can render material assistance in comprehending the facts of social pathology.

Unfortunately, M. Durkheim impoverishes sociology by his

attempt to delimit it. I must reproach him, particularly, with having miscomprehended, in his exaggerated fear of "subjectivism," which he throws up to Comte, the phenomenon, so evident in history, of the incorporation of grand intellectual states in every social fabric. Would it not be easy to show, for example, that the present constitution of France is in many respects the expression of the metaphysical mode of thought which triumphed with the French Revolution? The study of the fact of *property* is, truly enough, a different thing from the "psychology of the property-owner!" But how can M. Durkheim believe that the evolutionary drift of a period has such scant significance? Does not every "relation of causality" in the social scale imply at the same time the intervention of individuals (the passions of the parties interested, the motives of legislators, etc.) and a certain tendency, or orientation, of the event itself?

To consider the social phenomenon in its entirety, without arbitrarily eliminating any element of it; to distinguish in it grand classes of facts, economical, juridical, political, and intellectual; to study in each of these classes the more special facts, such as property, the family, marriage, religion, etc.; to examine how these different facts influence one another, how they become modified as a whole or successively; to seek out the individual modifications which they may present in the different familiar historical series, and to make allowance in all cases for the variations that are incident to race, geographical environment, etc.; to discover an evolutionary drift for particular facts and general classes of facts; to trace out a scheme of their correlative evolution which shall render prevision and practical action possible,—such seems to me to be the object of a system of sociology. It is clear that the comparative method is its means of procedure, and that all the aids offered by the other sciences are to be placed in its service.

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In *La cité moderne, métaphysique de la sociologie*,<sup>1</sup> M. JEAN IZOULET gives us the first volume of a large work treating of the "recon-

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<sup>1</sup> F. Alcan, publisher.

ciliation of the religious soul with the scientific mind." In this aspect it will interest the readers of *The Monist* and *The Open Court*. In the present volume, M. Izoulet studies the question in its philosophical aspect; he proposes in the forthcoming parts to study it in its historical aspect (Christianity and the Revolution), and in its political aspect (the Church and the State). One is a little dismayed at the undue bulk of this book, which takes up nearly seven hundred pages, and could readily bear condensation. One must censure the author also for a certain obscurity of style, the indiscriminate use of italics, and a perpetual division of the text into paragraphs, which distract the eye and break the chain of reasoning. We shall observe, however, that he is a man of sincerity and ardent faith. The guiding thought of his work is to trace psychology and morals to biological conditions, to found a psychology and system of ethics which shall be "bio-social," such that man shall no longer be considered as an independent ego, individual or animal, but as a solid whole, a member of a "city" or community. Man is not but *becomes*—in æsthetics, morals, and in thought—according as he passes from animality to humanity. This idea is not new; it has been largely exploited by Spencer, who is also not its discoverer; it is a familiar conception to nearly all of us, and all of us have already made some application of it. M. Izoulet might have mentioned many precursors in his line of thought. His originality consists rather in the application which he has made of the principle of association to the study of philosophical problems; which must not be taken to mean that he has absolutely solved them.

Nothing could be better than to eliminate happiness and personal welfare from ethics. "*I! I!* That is the eternal shibboleth of mystical ethics. It will take a long time to accustom Western peoples to the bio-social conception, conformably to which that full expansion of energies which is life and felicity can be procured to individuals only in and by a just association. . . . *I! my reward, for myself, here and now!* But have a care, poor people, you are entangled in the cog-wheels of the social organisation. That insight will make you wise." Without doubt. But that old truth does not prevent individuals from being profoundly sensible of misery, each

on his own account ; the collective consciousness does not abolish the individual consciousness, and, accordingly, the sacrifice of the individual in the interest of the whole, well grounded as it may be as a matter of reason, remains none the less painful as a matter of feeling.

M. Izoulet is desirous of reconciling the mechanism with the end. Man, he says, is not the geometrical centre of things ; but he remains, nevertheless, the optical centre, and, judging by himself of all the rest, he discovers in all places meaning and finality. "Mechanism is the outward view ; finalism is the inward view." At last, from the fusion of adverse doctrines we see emerge "finalistic monism or science pervaded with religion, or physics pervaded with metaphysics, or nature pervaded with God." True again. Nor is it a recent attempt of philosophy to integrate quality and quantity in the concept of the universe. But we shall never be able to do so except by an artifice of the mind ; that artifice, necessary as it is, leaves remaining, nevertheless, the immediate awareness of the ego and the non-ego, and the very finality which we impose on things is at once contradicted by the mechanism which things impose on us. The strangest error of M. Izoulet is that he flatters himself he has avoided agnosticism by substituting the word *incomprehensible* for the word *unknowable*. He wants man to *see* what he does not *understand*. But that *incomprehensible*, that thing or phantom which escapes our grasp, does it not reduce philosophy to the very dualism which it sought to escape from by it ? Is not this tantamount again to distinguishing between two different or heterogeneous species of "unknowable" things, and would it not be more correct to say that if all is *knowable*, what is always left is the *unknown* ?

I might review thus several problems, and the same conclusion would be established everywhere, that the antinomies which they reveal can only be resolved by considering the terms as simple logical attitudes of the mind which has posited them. They are our way even of comprehending and feeling ; they stand for the forms of our sensuous existence and understanding. The moment we transplant them without ourselves and hypostatise them, we create

a spiritualism, a materialism, an idealism, etc. But the criticism of these systems carries us back at once to the necessity of our nature, to our necessary mental condition; this it behooves us to know, to make precise—and finally to accept. Monism is that unification of phenomena which cloaks the unnoticed but inevitable artifice of the mind.

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I wish to point out in closing a more modest work by the late M. ALFRED DUMESNIL,—*Libre*.<sup>1</sup> M. Dumesnil was neither a professional philosopher nor a professional writer: He passed his youth in the intimate society of illustrious men, and devoted the rest of his life to the culture of plants, to the "*culture sans terre*," which has been so much spoken of. He belonged to that fine group of men born under the Empire and the Restoration, which accounted as its friend Eugène Noel, who is still living, and the sweet and noble Jean Macé, who has just died. I am glad to say that I have enjoyed, although somewhat late, the friendship of these two last-mentioned men, who have both written such refined and charming works. M. Dumesnil, like them, had preserved that "superior sense of existence" of which no trace is left in our morbid literature. *Libre* is rather a collection of thoughts than a book. But the author has grouped his thoughts under the following characteristic titles: "Self-refuge," "The Support of the Individual," "The Consolations of Nature," "The Consciousness of Life," and "The Expansion of the Individual." The basis of his belief is spiritualism as properly understood, and the bent of his mind a species of stoicism which does not isolate the individual from humanity. M. Dumesnil adheres to the immortality of the soul, which he does not understand, however, in the strict religious sense. But that matters little if we do not share his particular faith. It suffices that his book reveals in every page an upright and sincere soul, and that we may gather here a veritable bouquet of thoughts and maxims which are among the very best.

PARIS.

LUCIEN ARRÉAT.

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<sup>1</sup> Lemerre, publisher, 1895.

## CRITICISMS AND DISCUSSIONS.

### "THE KEY TO THE RIDDLE OF THE UNIVERSE."

*To the Editor of The Monist:*

Herewith a brief reply to your criticisms of my Monadism, published in the last issue of *The Monist*. As you bring forward only one main "difficulty," I will confine myself to dealing with that, and with as little outlay of words as possible. I have nothing of leading importance to add to the condensed "case for" my doctrine of the individual ego, as elaborated in *The Riddle of the Universe*. And I find that I have in that work already anticipated all the relevant objections made by you and dealt with them in full. It would have proved more satisfactory to me had my treatment of them been attacked in your "disquisition."

I shall ignore the plea that Monadology is "antiquated." Your own Monism, if the mere antiquity of a doctrine were a sign that it should be abandoned, would be in a very bad plight indeed. But let that pass. The sole consideration of interest to the inquirer is, What can be said on behalf of these seemingly clashing standpoints on the lines of an inductive rationalism? But do they clash so hopelessly? I would observe here in passing that I do not, as any reader of my *Riddle of the Universe* (Part II, Chap. VII, "The Universal Subject" especially) will allow, seek to discredit Monism, or rather an *idealistic* Monism, altogether. I there urge that not *mere* Monism, but a *Monistic Monadology* is the system most true to empirical facts—the necessary foundations of all metaphysical thinking. The world-order as revealed to consciousness is no Unity, but a Unity-Plurality, and must be explained accordingly.

But to return to the ego-crux. In attacking "my" doctrine of the ego, Mr. Editor, you impeach not merely my monadism, but also the belief of a very formidable army of thinkers, who on other counts would oppose monadism tooth and nail. The doctrine that a subject or ego is presupposed by even our most ordinary perceptions is one held by Kant, Fichte, Schopenhauer, and many Hegelians and others who reject monadism outright. I attach scant value to mere authority, but it is desirable that this fact should be made clear. You are not assailing the distinctive features of monadism, but a doctrine confirmed by the inquiries of a most

remarkable succession of thinkers, European and Oriental alike. I do not think that I exaggerate when I affirm that there is no doctrine of philosophy which can muster a stronger body of supporters. It is true that these supporters differ, one set viewing the ego as individual (a monad), others as the universal reason, universal will, etc., etc., but they agree as to the necessity of positing it.<sup>1</sup> So far, then, your disquisition does not concern monadism, but the wider issue of the doctrine of a subject. Those who concede such a subject need not be monadists, and many, indeed, are among my most valued critics.

Have you really followed my arguments, Mr. Editor? You urge that I endow my ego with "a kind of substantial existence, which, however, in order to escape the absurdities of his materialistic procedure, he makes as small as possible, only preserving its indivisibility and individuality. The result is his belief in monads." Well, a criticism like this is calculated to make one despair of elucidating one's beliefs! Let me say at once that I have endowed the ego with no "material" existence at all, as any reader of my long chapter, "The Individual Ego or Subject," (pp. 263-268.) will readily perceive. On the contrary, I am idealist and hold that matter is only a general name and that the particular objects to which in last resort this said name refers us, are simply modes of consciousness. Of course, seeing that "material objects" constitute a large portion of the content of the ego as *unfolded*, it is quite accurate to hold (*Riddle*, p. 331) that the ego, *in so far as it is revealed in and as objects*, is material, extended, etc. But the ego is not merely the virtuality or ground of that portion of its content termed "material objects," it is *also* the ground of those other modes of consciousness which are commonly termed "immaterial." The ego, in fact, as revealed may be viewed as material or immaterial, according to the special phases of its content which are under our immediate survey. It is the microcosm in which are hung the entire domains of "mind" (will, emotions, intellect) and of the so-called independent external world. "Mind" and "world" are *It* in process of unfoldment or self-revelation. But in view of the fact that "mind" and "world" are after all only apparitional phases of consciousness, the idealist has the last word. The *fontal* subject is not to be identified with any one phase of its consciousness (extension, resistance, pain, hearing, etc., etc.), but must be viewed as the ground, virtuality, potentiality, source, of *all phases alike*, only being adequately revealed in and as the entire stream of experience.<sup>2</sup> I have shown (*Riddle*, p. 280 and elsewhere) why the subject discussed as *prius* must be viewed as spiritual, i. e., as metaconscious potentiality of that which, emergent in the duality of the phenomenal life, we call self-awareness or consciousness. *It is no surd*. This and much correlated doctrine I have endeavored to establish at length. So far from knowing nothing about our subjects, I hold that we know

<sup>1</sup> And I have shown elsewhere that Hume and others, while nominally repudiating it, resort to explanations of experience which are quite inconsistent with their repudiation.

<sup>2</sup> *Qua* this present phenomenal life. The possibilities of revelation are, of course, limitless.

directly nothing else whatever. Our entire perceptual and mental treasures are—the output of our own souls!

As space for me is a mode in which subjectivity unfolds, I cannot attempt the absurdity of measuring monads. And I do not. The monads are not in space, but space, on the contrary, is in the monads its evolvers. The fontal monads are best discussed as centres of subjective activity, self-conscious, conscious, infra-conscious, etc., etc. "Size" is a conception only relevant to aspects of the world which these idealist master-builders glass in themselves. This view, however, does not negative the theoretic possibility that an "infinite glance" might be competent to compare and "size" their self-manifestations to themselves as varied world-pageants. But that is quite another matter. It concerns not the fontal monads, but their manifestations.

Let me state that the argument for an ego to account for memory and "psychical continuity" is only one of the mines which I exploit. It would suffice to establish *the* ego, but not a monadic ego; such is the view of many modern idealists. But in regard, sir, to your criticism "psychical continuity is nothing but the preservation of form in the flux of metabolic changes taking place in a sentient organism," I must point out that I have anticipated a like objection as embodied in the theories of other writers. (*Riddle*, 275-6, and 272.) Still I find the expression "form" used by you singularly obscure. Form-preservation here might well stand as a synonym for the continuity of a subject, more especially as you yourself hold that *all objective activities viewed as things-in themselves are in truth subjective*. I need surely not urge here that the "rational explanation" of memory is just what I require, and that the old physiological "continuity-of-the-vital-conditions" argument as put forward by Lewes and others is ludicrously weak. The supposed "material particles" are by supposition *many* activities, and what I want explained is the way in which their effects are given as *interrelated* in my memory-consciousness, where they appear, not as "psychical atoms," but as aspects only of a *unitary* self-identical experience, which subordinates all to itself. *A, B, C, D*, etc., the effects of brain-action are by supposition mere vanishing points, if unrelated in a mirroring subject, monadic or other. *They are rather individualLS ("psychical atoms") than an individualL*. Kant, I may observe, is quite at one with me in rejecting the absurdity of building up a *self-identical* consciousness out of *manifold* vanishing points. To conclude a necessarily one-sided letter, "The dependence of man's intelligence on brain-function, i. e., on related minor monads, is, up to a certain point at any rate, obvious. But, metaphysically interpreted, this dependence merely means that a complex of cerebral activities is continually being duplicated in a central monad, which may, of course, very well react upon these activities in its turn. Man, in fine, stands in his own monad, . . . though the mode of unfolding of this monad is largely guided by the workings of minor monads. Idealism may meet physiological psychology on this platform, and greet her with a warm

caress." (*Riddle*, p. 322.) But a proper treatment of the problems suggested by your criticism would involve writing an essay, and I have already written too much.

E. DOUGLAS FAWCETT.

WINTHORPE. TORQUAY, ENGLAND.

#### IN DEFENCE OF TRUE MUSIC.

Having read Mr. Crozat Converse's article in your issue for April with great interest but without agreement, I am bold enough to make the following few remarks upon the same subject. I know that the theory of onomatopoeia in music has been held by many celebrated musicians, and of course it is conceivable that the music of their composing was truly the expression of their emotions, feelings, and sentiments, always supposing that those same emotions, feelings, and sentiments were different, not only in intensity but in kind, from those of the generality of their fellow mortals.

It was this that Robert Browning had in his mind when he put such words as these into the mouth of the Abbé Vogler :

" All through my keys that gave their sound to a wish of my soul,  
All through my soul that praised as its wish flowed visibly forth,  
All through music and me ! For think, had I painted the whole,  
Why there it had stood, to see, nor the process so wonder worth,  
Had I written the same, made verse—still effect proceeds from cause,  
Ye know why the forms are fair, ye hear how the tale is told,  
It is all triumphant art. . . .  
But here is the finger of God, a flash of the will that can ;  
Existent behind all laws that made them, and lo, they are. . . .  
God hath a few of us whom He whispers in the ear,  
The rest may reason and welcome, 'tis we musicians know."

Although this great musician believed music to be a language, it was a language that could be understood only by the composer, a sort of conversation between God and the musician, which was as little understood by the listener as a conversation carried on in Greek would be to a man ignorant of that language. Would not this be narrowing to a dangerous degree the usefulness of the most beloved of the arts ? The musician, alone in his chamber, is composing harmonies which are destined to thrill the hearts of thousands and thousands of his fellow beings, separated from him by station, education, country, and kin ; the sympathies of the musician and his listeners may be as far apart, as the East is from the West, on all subjects of importance, yet on one, and on one only, they can join issue—on that of sweet sounds. This would scarcely be the case if the music was nothing else than the expression of that musician's feelings on the subjects of love and hate, fear and desire.

To say that we find an interpretation of our sentiments and feelings in music is not sufficient to prove that we invented, as a language of feelings and emotions, those same heart-stirring, soul-subduing, miracle-working strains. Moreover, what

we call music, and in which sense only it seems to be understood by Mr. Crozat Converse, should more properly be called Harmony. All sweet sound is music, whereas harmony is an arbitrary arrangement of chords as found in the diatonic scale, with sixteen vibrations to the second for its lowest musical note and two thousand for its highest.

All the music of the Greeks and Orientals, the music of animate and inanimate nature, is enharmonic and has nothing in connexion with our system of chords but is not the less music on that account, and although it is possible to reproduce on the piano the songs of the nightingale, the lark, and many other birds, or to imitate the roar of thunder, or the falling of water, such imitation is weak and unworthy of the great powers of true music; the result, although fairly correct as to sound,—not, however, altogether so, for we have no musical note low enough to correspond to the roar of thunder,—is feeble and unreal when compared with the natural sounds of nature. I do not think that the united voice of mankind would allow us to say that there was no music in the voices of nature, nor would it allow us to say that this music had any exact meaning for them, or that any feelings other than simple admiration for beauty in sound were roused in them by listening to it. Though it may not be possible to analyse our feelings when we listen to the fall of the rain on a warm spring evening, and as it ceases its gentle drip, we hear the voice of a black-bird arising from the adjoining coppice; or again, on a dewy summer's morning as the sun rises a lark springs from the grass at our feet and soaring into the sky pours forth its entrancing tones; yet such sounds have brought tears of surprise and gratitude to our eyes, and have called forth tributes of praise from some of our greatest poets, to quote one only, Shelley's immortal song "To the Skylark."

"Teach us, sprite or bird,  
What sweet thoughts are thine.  
I have never heard  
Praise of love and wine  
That panted forth a flood of rapture so divine.

"Chorus hymeneal,  
Or triumphant chant,  
Matched with thine would be all  
But an empty vaunt,—  
A thing wherein we feel there is some hidden want.

"Better than all measures  
Of delight and sound,  
Better than all treasures  
That in books are found,  
Thy skill to poet were, thou scorner of the ground."

No meaning, in the strict sense of the word, is conveyed to us, even to the poet, by those delicious sounds. If, then, that natural music suggests nothing definite, why should we hope to extract exact thoughts from music heard in conformity

with the diatonic scale? Harmony is an art, and, like the rest of the arts, loses its artistic value when pressed to serve ends other than its own.

Mr. Crozat Converse says of Beethoven, Wagner, and Berlioz, "the more those tone-masters' works are studied, in an onomatopoeic regard, the more do these masters seem to tacitly confess their being hindered in the use of tonal onomatopoeia by the imperfections in, and limitations of, the present system of musical notation," there is no doubt that the restrictions and limitations of the diatonic scale are great, for instance, there are a hundred different shades of tone between any two adjoining notes on the piano all of which are lost to the pianist. The music of the Orientals is enharmonic and in consequence is better able to imitate the music of nature than is ours.

There was an excuse for the Greeks being imitators of nature, because to them the murmur of water was the voice of a river-god, the rustling of the leaves in the forest the voice of Pan, and the sighing of the reeds and rushes the song of the Syrinx. They were pantheists, and their music was employed in the noblest way possible in imitating the voices of their gods, who dwelt in Nature's phenomena.

Surely, for us music has a higher function to perform than that of mere imitation, or of giving an expression to our emotions, but apparently Mr. Crozat Converse does not think so; he speaks of "the dominance of the principles of imitation which reaches beyond analogy." Why should pure music be an imitation of anything? Plausible as the music of the Orientals may be, they have never approached us in realisation of the ideal in music. They have spent their endeavors in imitation, in mere repetition of the natural sounds around them. From a like fate happily our composers have escaped, thanks to the restrictions of our musical system. Haydn, in his oratorio, "The Creation," has approached the nearest to a perfect imitation of a natural phenomenon, referring to that bar which Dr. Paul Carus also mentions in his "Significance of Music," in which the creation of light is described. Crowest writes: "Here by his sudden and masterly recourse to the refulgent harmony of the major tonic of the key, Haydn has succeeded in producing one of the grandest effects [considered, I presume, in an onomatopoeic light] of which the musical art can boast."

But who can read without sorrow of the manner in which Haydn is reported to have overcome the onomatopoeic difficulties connected with the tempest music in his opera, "The Devil on Two Sticks."

The descriptive onomatopoeic style of music has been, with but few exceptions, so unsuccessful, that there is little to prove the theory true. The difficulty of explaining Wagner's grand and heart-stirring strains by the theory of onomatopoeia was seemingly too great for Mr. Crozat Converse, for he says: "I think we may safely assign such tonal effects as we cannot under the present conclusions of musical science trace to its influence—for example, Wagner's dream-sounds—to the realm of unconscious onomatopoeia." That is one way of avoiding a difficulty. I would rather assign all that wonderfully powerful music of Wagner's to Socrates's theory of pre-

existence, and say that the strains he heard in other spheres haunted his memory and flowed out through his finger-tips, or to call him "God-inspired and glad," rather than to seek to find the key in his own powers of unconscious imitation.

If music is only an imitative expression of the sentiments and feelings of mankind, then the theory of tonal onomatopy is correct, and music loses her high place amongst the arts; but if, on the other hand, music is a separate reality, eternal with the eternal, as real as are those sentiments and feelings of which she is made only an expression, then the theory falls through, and we may still worship the muse as a sublime, eternal power, an expression, if we care to call it so, of the Eternal God.

EMILIA DIGBY.

TICEHURST, SUSSEX, ENGLAND.

## BOOK REVIEWS.

THE FOUNDATIONS OF BELIEF. By the *Rt. Hon. Arthur James Balfour*. New York and London: Longmans, Green, & Co. 1895. Pages, 366.

There is perhaps no book of recent date that has been more misunderstood than Mr. Balfour's *Foundations of Belief*. It has been claimed by dogmatic theologians as a defence of dogmatism and reviewers have placed it on a line with M. Brunetière's *Bankruptcy of Science*, while freethinkers have denounced it as anti-progressive, illiberal, and hostile to science. The truth is that Mr. Balfour is a calm and considerate thinker who impartially delineates the present religious condition with little, if any, personal admixture of prejudice.

The first impression of the book appears to justify the prevalent notion that Mr. Balfour employs the logic of Mill in corroboration of Calvin's view: for it is true that Mr. Balfour rejects what he calls the scientific world-conception. He opposes naturalism; he dwells on the insufficiency of reason, and makes "authority" the supreme power which rules over all, regulating the conduct of individuals and swaying the fate of nations. Mr. Balfour's language, especially his use of the terms "science" and "reason," give unavoidably the impression that he is anti-scientific and anti-rationalistic, and it would seem as if our own position, the position of *The Monist* and *The Open Court*, which propounds a religion of science, could find no more antagonistic adversary than the author of *The Foundations of Belief*.

The book has no index, which makes a cursory glance at its contents impossible. It is in this respect like German books, which must either be left alone or read through, if misconceptions are to be avoided. The prominence of the author and the great sensation which the book created, is, however, a sufficient inducement to read the book through, and we are astonished to find that all the reviews that ever came to our hands have mistaken the spirit of its author. There is more agreement, even in the very letter, between Mr. Balfour's position and our own than could be anticipated of a work whose main subject is a denunciation of the narrowness and insufficiency of the scientific world-conception.

We must consider that when Mr. Balfour speaks of science he means that pseudo-science which at present boastfully and noisily assumes all the pretensions that genuine science alone is entitled to. Mr. Balfour's criticisms of science are the

very same strictures which we have again and again made on pseudo-science. He denounces "the naturalistic view that free-will is an absurdity," saying that "the sense of constraint and inevitableness would be as embarrassing to a savage in the act of choice as it would to his more cultivated descendant." Yet he admits that "there is nothing in the theory of determinism which need modify the substance of the moral law." This reminds us of our own position, for we uphold most emphatically the freedom of will, viz., the freedom of choice or the theory that our actions are our own and that through them more than through external conditions our future is moulded. We distinguish between Fatalism and Determinism. Determinism is the theory that everything is determined, both by physical conditions and by the free acts of aspiring beings. Fatalism is the theory that there is no freedom of will, and that whatever a man might choose to do his actions as well as his fate are inevitable. There is room for freedom of will in determinism, as we define it, but not in fatalism.

Mr. Balfour further objects to the ethical theory that the greatest happiness of the greatest number is the right end of action. Here again our agreement is remarkable. We have lost no opportunity of denouncing hedonism, not only as misleading but as fundamentally untrue. The reviewer has condensed his views on the subject in a little tale entitled "The Philosopher's Martyrdom," which is a *reductio ad absurdum* of the Spencerian ethics. The truth is that duty has nothing to do with sentiment; and ethics cannot be established upon the individualistic principle which assumes that death is an absolute finality, or, to use Mr. Balfour's words "refuses to admit that the deeds done and the character formed in this life can flow over into another." We cannot in ethics dispense with the problems of the whence and whither of the human soul. Without them we should have worldly prudence only but no ethics. Indeed, we may say that ethical action is precisely such action as is governed by the consideration of what will be when the present life has come to a close.

As to æsthetics, Mr. Balfour says that "Mr. Spencer's theory, like all others which endeavor to trace back the pleasure-giving qualities of art to some simple and original association, slurs over the real difficulties of the problem." Mr. Spencer characterises art as "a useless and superfluous exercise of human faculties." Because he finds that it originates from the *Spieltrieb* as Schiller calls it, he identifies it with sport and imagines that the higher arts are distinguished from the lower ones by complexity. This, our verdict of the Spencerian art conception, is very similar to Mr. Balfour's.

We have criticised (in *The Soul of Man*, pp. 9-14) Professor Clifford's proposition that the rational originates from the non-rational, and have again and again called attention to the fact that man's reason is the reflected image of the World-Logos, and that the cosmic order is the prototype of man's reason; it is the standard by which we measure the rationality of reason. If a man's reason agrees with those features of reality which make of the world an orderly whole, his arguments will be

correct. Wherever they are in contradiction man will go astray. In other words, the nature of man's reason is not subjectivity but objectivity. Reason is not a product of man's intellect, it is not merely ideal; but man's intellect is a product of that cosmic order which St. John calls the Logos that was in the beginning, it is objective and real. Mr. Balfour's views are here again in close accord with our own. He says: "If the world is not made by Reason, Reason is at all events made by the world;" but he rejects "the non-rational origin of reason" which, as he says, "is a necessary corollary of the naturalistic scheme."

Our agnostic friends in England and America have often criticised our position as being unfair to agnosticism, and our rejection of Mr. Spencer's conception of the first principles as being unknowable is well known. We are glad to see that Mr. Balfour when speaking on the philosophic basis of naturalism finds the same fault which we discover in agnosticism. He quotes Locke that he "suspects that natural philosophy is not capable of being made a science." and adds, "that this remarkable display of philosophic resignation in the father of modern empiricism has been imitated by a long line of distinguished successors." The basis of naturalism is experience, but what these experiences are is not clearly defined by empiricists; nor does Mr. Balfour enter into the problem.

In the third part of the book Mr. Balfour grapples with the problem of "Authority," which, in contrast to Reason, he calls "a group of non-rational causes." The word "non-rational" and the opposition of Authority to Reason have been a source of many misunderstandings. However, a careful reading of these chapters shows that Mr. Balfour understands by Reason the argumentative faculty of an individual man with all its shortcomings and liabilities to error. By Authority he means what we called above the World-Logos, and here our agreement with Mr. Balfour is as pronounced as in all previous instances. But while Mr. Balfour speaks of this Authority that dominates over us as being God, we have inversely defined God as "the Authority of moral conduct." The difference certainly is not great in spite of this inversion, and, in order to show how little antiquated dogmatism or anti-scientific notions are embodied in Mr. Balfour's conception of Authority, we quote what he says about "this group of influences" (sic!) which in one word he calls Authority. He says (p. 201): "They presuppose, to begin with, 'the beliefs of perception, memory, and expectation in their elementary shape; and 'they also imply the existence of an organism fitted for their hospitable reception by 'ages of ancestral preparation. But these conditions, though necessary, are clearly 'not enough; the appropriate environment has also to be provided. And though I 'shall not attempt to analyse with the least approach to completeness the elements 'of which that environment consists, yet it contains one group of causes so important in their collective operation, and yet in popular discourse so often misrepresented, that a detailed notice of it seems desirable."

This is Mr. Balfour's "Authority," which "moulds our feelings, our aspirations, and, what we are more immediately concerned with, our beliefs." And he

adds: "It is from Authority that Reason itself draws its most important premises." Mr. Balfour calls Authority non-rational because he finds it operative as an unconscious power previous to the origin of conscious reasoning. He says: "To Reason" is largely due the growth of new and the sifting of old knowledge. By Reason "also is directed or misdirected the public policy of communities within the narrow limits of deviation permitted by accepted custom and tradition."

One main mistake of naturalism to which Mr. Balfour calls attention is the "unbalanced consideration of the vastness of Nature." The God of many naturalists is conceived "as moved by the mass of His own works, as lost in spaces of His own creation. He sets store by the number of square miles His creatures inhabit or the foot-pounds of energy they are capable of developing." "But," adds Mr. Balfour, "the magnitude and complexity of the natural world should indeed have no bearing on our conception of God's relation either to us or to it."

So far, we have to recount a number of remarkable agreements between Mr. Balfour's *Foundation of Belief*, which are based upon a consideration of the insufficiency of science, and our own view, which is the Religion of Science. If Mr. Balfour indeed represents the dogmatic church of Christianity, we feel more than ever confident that in genuine science agreement is not only possible, but will actually in the end be accomplished.

We cannot say that Mr. Balfour's book contains a solution of the religious problem. He has not attempted in it to work out a consistent philosophy of religion, and traces of a dualistic, nay, even of an agnostic, conception are visible in many passages.

Mr. Balfour's dualism is most apparent in the first chapter of the third part, "Causes of Experience," where he divides the realm of our mental aspirations into two disparate halves, "the natural world and the spiritual world, the world which is immediately subject to causation, and the world which is immediately subject to God." He continues: "The laws of the natural world are revealed to us by the discoveries of science, while the laws of the spiritual world are revealed to us through the authority of spiritual intuitions, inspired witnesses, or divinely guided institutions. And the two regions of knowledge lie side by side, contiguous but not connected, like empires of different race and language which own no common jurisdiction nor hold any intercourse with each other, except along a disputed and wavering frontier where no superior power exists to settle their quarrels or determine their respective limits" (p. 194). It would lead us too far here to outline our position, which changes this Dualism into a higher Monism in which causation is no longer opposed to God, but is traceable also in spiritual intuitions, inspired witnesses, and divine institutions. We recognise in causation a part and parcel of that power which Mr. Balfour calls Authority. There is not only contiguity, but the most intimate connexion. There are differences of lower and higher ranges of nature, but the divinity of nature lies hidden even in its very elements. The World-Logos, being eternal, was in the beginning, and extends also into the in-

finitely small; there is no atom bare of that divine guidance which in its most salient actions scientists formulate in the law of causation.

Mr. Balfour's agnosticism appears in his strictures on Mr. Spencer's belief in the unknowable, from the depths of which, Mr. Balfour says, "should emerge the certitudes of religion." Here he agrees better with Mr. Spencer than he is himself aware of, and Mr. Spencer does not fail to call attention to the fact in his reply which appeared in the latest *Fortnightly Review*. We add that religion nowhere rises from the unknown or unknowable, for what does the savage or civilised man care about a thing or God of whom he can know nothing? The savage worships the thunder-god, *not* because he does *not* know the nature of lightning, but because he does know the obvious dangers connected with it; he is afraid of it. In the same way man began to be afraid of the curse of sin, which the moral teachers of men, preachers and prophets, pointed out to him. If we base religion on agnosticism, if we let it rise from our ignorance, religious truth will ever remain a blank for us, which we can fill out with our imagination; and ethics becomes a matter of taste. Morality, in fact, is, according to Mr. Spencer, that which pleases the majority of mankind. However, if we base religion upon the experiences of mankind, we shall discover the spiritual needs of man, the needs for strengthening his character in temptation, for guidance in the intricacies of life, for comfort in affliction. We shall discover that the power that punishes crime is as real as gravitation, and that its authority is ultimately identical with the authority of Science and Reason.

The gravest mistake of Mr. Balfour's book, in our opinion, is the misapplication of the name "science." By honoring pseudo-science with the name of science he seems to imply that there is no way out of the fashionable errors of a number of scientists, except by opposing to science the authority of antiquated church traditions, which should be accepted without criticism, and in this sense, indeed, Mr. Balfour's book is commonly understood. We are happy to state that this is a mistake, and can say so on the best authority,—Mr. Balfour himself. While he condemns the theories that commonly go by the name of science, he entirely accepts the proposition that "genuine science is divine," and we only wish that to forestall misconceptions, he had said so in his book. Nor does Mr. Balfour anywhere oppose "Authority to Science," much less does he think that "Reason is ungodly." He would not deny that in all probability his views are not so wide apart from those of the editorial position of *The Monist*, as may seem at first sight.

Mr. Balfour says on page 83; "I am not aware that any one has as yet endeavored to construct the catechism of the future purged of every element drawn from any other source than the naturalistic creed. It is greatly to be desired that this task should be undertaken in an impartial spirit." We submit that we have written a Catechism of Naturalism, which appeared in *The Open Court*, under the title "A Catechism of the Religion of Science," and has been republished in pamphlet form under the title *The Religion of Science*. But we have to add that the

propositions of our conception of Naturalism are almost throughout contrary to the propositions of Naturalism as criticised by Mr. Balfour.

It would be an interesting task to compare Mr. Balfour's propositions offered in criticism of science with those which we have made in the name of science. In spite of a radical difference in our methods of attacking the problem, there is a coincidence in detail which is remarkable and would be curious if it were not conditioned by a deeper connexion, which proves that on whatever radius we may advance in our search for the centre of the circle, we shall at last meet in one and the same point.

We regret that Mr. Balfour, in discussing the basic ideas of religion, did not enter into one problem, which after all will prove to be the problem of all problems. I mean the problem of personality, which is closely connected and even in some respects identical with that other great problem, the nature of God. It is probable that Mr. Balfour omitted these questions on good purpose, because they would have involved him in intricate investigations; but we hope that he will find leisure for another book, in which he will give us his views on the nature of man's soul.

P. C.

STORY OF THE LIFE OF JESUS. For the Young. Told from an Ethical Standpoint.

By *W. L. Sheldon*. Philadelphia: S. Burns Weston. 1895. Pages, 148.

AS OTHERS SAW HIM. A Retrospect. A. D. 54. Boston and New York: Houghton, Mifflin, and Company. 1895. Pages, 217.

Christ is a living power in the world, for the Christ-idea constitutes one of the most potent factors of our civilisation. No one, therefore, whose labors lie in the field of public morals can afford to avoid the question "What do you think of Christ?" The unbeliever not less than the believer must take issue and solve the problem, each one to his own satisfaction, before he can think of pursuing his course in life with consistency.

The two books before us offer two replies, both given by men who refuse to recognise in Christ a supernatural revelation, but while the one, destined for the use of children in the Ethical Sunday schools, omits every allusion to theology and changes Jesus into an ethical teacher after the fashion of the Societies for Ethical Culture, the other uses the Christian traditions without either endorsing a belief in the supernatural mission of Christ or introducing into the narrative the properly miraculous as actual facts.

The story of the life of Jesus by *W. L. Sheldon* is a long-winded recapitulation of the gospel reports with every allusion to God, angels, miracles, and immortality left out. Thus, when the shepherds were in the fields, Mr. Sheldon says, "It seemed as if there were a choir of voices singing all about them in the darkness, "pouring forth words of beauty, so sweet that at first the men could not understand them. Yet as they listened, it was as if amid the music they kept hearing

"one refrain. It came to them over and over again, the beautiful words: *peace on earth, good-will to men.*" The "Glory to God in the Highest" is dropped as too theological, the purpose of the book being "not to awaken in the minds of the young any questions about problems of theology" nor to make any "attempt to antagonise it." This plan has been carried out and it is painful to observe how stale and unprofitable the story of Jesus grows by this treatment. Mr. Sheldon's solution of the problem is apparently wrong. A non-theological edition of the Gospels *ad usum Delphini*, will not be helpful to the children; for it conceals instead of explaining, and by concealing it misrepresents; nay, worse than that, it mystifies. The non-committal policy which neither endorses nor antagonises and leaves a blank is wrong.

The book, *As Others Saw Him*, is anonymous. Whoever the author may be, he shows a rare knowledge of all the Christian and Jewish traditions. And his knowledge is not mere scholarship; it has become alive by the touch of the poet's wand. We see Jesus before us as an actor in the great drama which ended with his tragic death.

The plot of the book is as simple as it is exquisite, and no historical novelist has as yet succeeded in producing in a few lines so grand an effect. Our anonymous author does not speak at all himself; he presents the story in the shape of a letter written by Meshullam Ben Zadok, a scribe of the Jews at Alexandria, to his friend Aglaophonos, a Greek physician of Corinth. This letter is a reply to an inquiry concerning Saul of Tarsus, who had created a great excitement in Corinth, and also concerning Jesus the Nazarene of whom Saul said "that he was a God like Apollo, that had come down on earth for a while to live his life among men." We learn by implication that years ago Meshullam lived in Jerusalem and that at that time Aglaophonos had visited the holy city and was entertained in the house of Meshullam, the scribe. Concerning Saul, Meshullam's reply is cool; his words imply even a warning against the man on account of his unsettled character and inconsiderate rashness.

Meshullam, alluding to the martyrdom of Stephanos, writes of Saul: "He is well instructed in our law . . . yet he is not of the disciples of Aaron that love peace; for when I last heard of him he was among the leaders of a riot in which a man was slain. And now I think thereon, I am almost certain that the slain man was of the followers of Jesus the Nazarene, and this Saul was among the bitterest against them. . . . Truly, men's minds are as the wind that bloweth hither and thither."

Meshullam continues: "But as for that Jesus of Nazara, I can tell thee much if not all. For I was at Jerusalem all the time he passed for a leader of men up to his shameful death. At first I admired him for his greatness of soul and goodness of life, but in the end I came to see that he was a danger to our nation, and, though unwillingly, I was of those who voted for his death in the Council of Twenty-Three. Yet I cannot tell thee all I know in the compass of a letter, so I

"have written it at large for thee, and it will be delivered unto thee even with this 'letter.'"

The book *As Others Saw Him* is this description of events by the Scribe Meshullam who hesitatingly and regrettingly voted for Jesus's death. There are sixteen chapters, all full of life and action, and explaining the various situations to the Greek physician who knows little of the Jewish parties and Jewish customs. Thus the book supplies in the shape of novelistic fiction a commentary on the New Testament. The author introduces playfully all the light which the Talmud and also apocryphal traditions throw upon the accounts of the canonical Gospels. Delitsch, the famous Old Testament scholar and author of *Ein Tag in Capernaum*, could not have done better. Here we understand how and why the same people who welcomed Jesus with shouts of Hosanna could, after a few days, vociferously demand his execution. If the book is written by a Christian and a believer, it is a masterpiece of poetical imagination; for it exhibits the grandeur of Christ's picture in its reflexion from the soul of a noble Jew, who, considering all in all, offers from his Jewish standpoint good reasons for rejecting Jesus. If, however, the book is written by a Jew, which is the more probable solution of its anonymous appearance, we should say that it has been written with the heart-blood of the author who finds himself unable to accept Jesus as the Jewish Messiah, and yet adopts the motto: "It cannot be that a prophet perish out of Jerusalem."

The tone of the book is noble and elevating, the whole conception is poetical, and its expositions are very instructive without showing the least tinge of pedantry.

*Non olet lucernam.*

P. C.

GENETIC PHILOSOPHY. By David Jayne Hill. New York and London: Macmillan & Co. 1893. Pages, 382. Price, \$1.75.

The author begins with an examination of the general protest against philosophy in its old sense as ontology, and poses the question whether this discipline may not be rehabilitated in a more modern form, as a synthesis of the results of positive inquiry, which, in reality, aims to reach practically the same goal, but by a different method. That method, which the author briefly but precisely traces in the developmental process of science, he has stated in contrast to the ontological formulations of the problem as follows:

"Being, as apprehended by our intelligence, is found to possess continuity, and 'all facts are the aspects of a process. When, therefore, facts are translated into 'thought, they must not be sundered and isolated, floated off from their attachments and treated as independent entities. The continuity which connects them as 'real must also connect them as ideal. In other words, they must be genetically 'regarded, or considered as aspects of a continuous process to which they must be 'referred. The genetic method, then, consists in referring every fact to its place in 'the series to which it belongs."

The goal of the genetic method is stated as follows:

"The genetic method does not aim at a complete individual synthesis. Under its guidance, contemporary philosophy should not attempt the reformulation of all knowledge. Its function is that of an intellectual clearing-house, to borrow a figure from the commercial world. The business of the philosopher is to equate the deposits and indicate the deficits of the special sciences. This is an office which many can perform better than a few, and thus philosophy as well as science may be made social and co-operative, although it will always remain true that philosophy in the active sense is not every man's business."

Conformably to the method prescribed, President Hill takes up successively in the ten chapters of his book the genesis of Matter, Life, Consciousness, Feeling, Thought, Will, Art, Morality, Religion, and Science. He presents and elaborates in a vigorous and graphic style the newest results and theories which bear on these various questions, and although the cultivators of certain branches of metaphysics will receive the impression that President Hill has slighted some important aspects of philosophy which in themselves are justly entitled to the rank of a scientific discipline, it must be remembered that he restricts the designation "philosophy" to individual attempts "to solve the central problems of knowing and being." Upon the whole his estimates are just and practical.

We are not inclined to accept, to their full extent, the introductory remarks of the author on the general character and methods of "philosophy," however pertinent they may be to certain systems and epochs; nevertheless, the book may be characterised as a good synoptic introduction into the new synthetic philosophy of science.

T. J. McC.

LOGIC. By *Dr. Christoph Sigwart*, Professor of Philosophy at the University of Tübingen. Translated by *Helen Dendy*. London: Swan Sonnenschein & Co. New York: Macmillan & Co. 1895. Two Volumes. Price, \$5.50. Pp. Vol. I, 403. Pp., Vol. II, 592.

We may refer our readers for a detailed analysis of Professor Sigwart's views of logic to the review which we gave of the second edition of the German work in the July, 1894, *Monist*, page 614, and to No. 107 of *The Open Court*, 1889. It would be entirely supererogatory to say anything about the position which Professor Sigwart's work holds in this department of inquiry, or to emphasise its importance as a text-book and compendium of the subject. Both are recognised, and the translator, by her careful work, and the publishers, by the splendid form in which they have produced the volumes, have rendered an important service to the English-speaking public. In a brief Preface to the English translation the author acknowledges his great indebtedness to English logicians, and trusts that for this reason his book will not appear to English readers entirely as a foreigner. He has also a brief word to say on the almost insuperable difficulties attending the translation of a philosophical treatise, and assures us on the ground of his own careful revision that the translation is completely free from misunderstandings, and that it represents every-

where as exactly as possible the original text. So far as we have been able to see his confidence is justified, although, drawing its material, as the work does, from so many special sciences, one can scarcely imagine a book in which the liability to mistakes is greater.<sup>1</sup> The second volume is supplied with a good index of subjects, to which an index of names might have been added. *A propos* of difficulties of translation, it would be an excellent practice, and no inconsiderable aid to future workers, if the translators of philosophical works would always add a glossary of the German terms for which we have no exact English equivalents and of which the translations vary, together with the renderings which they have adopted in each special case. The work belongs to the *Library of Philosophy*, edited by J. H. Muirhead.

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COMTE, MILL, AND SPENCER. AN OUTLINE OF PHILOSOPHY. By *John Watson, LL.D.* Glasgow: James Maclehose & Sons. New York: Macmillan & Co. 1895. Pages, 302. Price, \$1.75.

There is a great danger just now, the author thinks, "that philosophy, in the large sense in which it was understood by Plato and Aristotle, should be lost in artificial divisions and in a mass of empirical detail." He has accordingly sought to indicate by the sub-title of his little work that he aims to present the fundamental elements of philosophy as a scientific discipline. In other words, he has sought to be "at once critical and constructive." His philosophical creed, which he denominates Intellectual Idealism, is "the doctrine that we are capable of knowing reality as it actually is, and that reality when so known is absolutely rational." The method by which he has attempted to enforce his views is "to show that the ideas which lie at the basis of mathematics, physics, biology, psychology and ethics, religion and art, are related to each other as developing forms or phases of one idea—the idea of self-conscious reason. But, partly out of respect for their eminence, and partly as a means of orientation, both for myself and for the students under my charge (for whom this Outline was originally prepared), I have examined certain views of Comte, Mill, and Spencer—and also, I may add, of Darwin and Kant—which appear to me inadequate."

Chapter I. states in excellent terms the problem of philosophy as conceived by the author, and sums up the distinctions between science proper and philosophy proper as follows:

"Firstly, science deals with objects as such, philosophy with the knowledge of objects. Secondly, science assumes that real knowledge is possible, philosophy inquires into the truth of that assumption. Thirdly, science deals with the relations of objects to one another, philosophy with their relations to existence as a

<sup>1</sup>It may seem trivial, but it will perhaps be helpful in the correction of a possible second edition of the translation to state, that in a footnote on page 521, Vol. 2, *flagellata* and *dinoflagellata* should be *flagellata* and *dinoflagellata*.

"whole. More shortly, science treats of modes of existence, philosophy of existence in its completeness."

Chapter II. treats of the Philosophy of August Comte, where it appears that Comte's doctrine of the relativity of knowledge rests upon a fundamental contradiction separating "existence into two mutually exclusive parts, the phenomenal and the real," and assuming "two opposite kinds of intelligence." The two assumptions, according to Professor Watson, are self-contradictory. He proposes "to start from the principle that there is one intelligible universe and one kind of intelligence." Chapters III., IV., V., and VI. treat of the Philosophy of Nature, including, respectively, Geometry, Arithmetic and Algebra, the Physical Sciences, and Biological science. Professor Watson's discussions here are elucidative and exhibit very distinctly the weak points of Mill's view, that the formal sciences rest upon experience, in its restricted sense. In the discussion of biological science, the author chiefly considers "whether accepting the theory of development as the only "tenable explanation of the characteristics and changes of living beings, we have "reached an ultimate explanation, or whether we have only solved a subordinate "problem." The author's opinion is that "the world is in no sense a product of "chance, but must be conceived from the point of view of immanent teleology." Chapter VII. treats of the Relations of Biology and Philosophy; Chapter VIII. of the Philosophy of the Mind; Chapters IX., X., and XI. of Moral Philosophy; and Chapter XII. of the Philosophy of the Absolute—a treatment, it will be seen, which accords with the author's rough division of existence into the three great related spheres, of nature, mind, and ego. Although this division may for some purpose or other be economical and convenient one, it is nevertheless one which demands its justification as the outcome of a philosophical system, and not as its postulate.

In the main, the positions which Professor Watson takes in his criticisms of the three thinkers that figure in the title of his book, are strong. We may observe that Darwin is mentioned in the Table of Contents, (which does not seem to have been prepared by the author,) as "an unsophisticated scientific man," and also that a passage from *The Tempest* is incorrectly stated as being from *Midsummer Night's Dream*.

T. J. McC.

DER GEIST DER NEUEREN PHILOSOPHIE. By Robert Schellwien. Leipsic: Alfred Janssen. 1895. Pages, 163. Price, M. 2.40.

It is difficult to get at Mr. Schellwien's ideas, which are much mixed with platitudes, and not altogether free from obscurity. Human consciousness, he says, has as its necessary and immutable presupposition unconsciousness; it can arise only by proceeding from unconsciousness. All knowledge of man, therefore, is the abolition of non-knowledge. Of the advance from unconsciousness to consciousness, from non-knowledge to knowledge the fundamental form is the relation of subject and object, where subject is contrasted to object but seeks always to annihilate that opposition. Here the *negative* character of knowledge is exhibited. In self-con-

scious man the subject is perceived as the absolute and knowledge as identical with existence, but not without the negative aspect that the subject is absolute only in so far as it is the agent of a creative mimicry, or mimicking creation, of existence, and knowledge only the *ideal* equation of Being. Again, all knowledge comes from and goes back into individual minds. Therefore, if the progressive development of knowledge, the spirit of the thought of a time, is to be understood, our understanding of it must be sought in the individual spirits from whence it took its new trend of development. Such are the systems of the great philosophers which Mr. Schellwien has undertaken to study in the light, and as corroborations, of his views, beginning with Spinoza, whose philosophy, after the author's formal introduction, takes up the bulk of this first part.

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PRENOZIONI DI FILOSOFIA SCIENTIFICA. By *Prof. Carlo Salvadori*. Montegiorgio : Ugolino Delbello. 1894. Pages, 312. Price, L. 3.

This little volume is designed as a text-book of elementary philosophy for students in lyceums and colleges. It professes to give no more than mere hints, *accenni*, on the subjects which it treats, and might be compared to the manuals which are widely used in German universities under the name of "encyclopædias"—works giving bird's-eye views, skeleton-outlines, definitions, etc., of the subjects treated. The general idea of the book is excellent. According to the more modern point of view it begins with psychology and ends with logic and ethics. Under Psychology Professor Salvadori treats man's mental nature in all its comprehensive entirety, relegating to logic and ethics only what is included under those heads in their restricted sense. The author is unusually well acquainted with the philosophical and scientific literature of England, France, and Germany, and has made valuable use of the results of the most recent writers of those countries. Upon the whole, he has produced a concise, useful, and suggestive little manual, in a line where such books are much needed.

μκρκ.

PHILOSOPHIE UND ERKENNTNISSTHEORIE. By *Dr. Ludwig Busse*. Leipsic : S. Hirzel. 1894. Pp. 288.

The philosophical investigations which form the body of this work grew up in Japan in connexion with the lectures and exercises which Dr. Busse conducted while Professor of Philosophy in the Teikoku Daigaku, the Imperial University, at Tokio, and are dedicated to his old Japanese students. The book possesses not a little of interest through this association, as many will be desirous to know what manner of philosophy is provided to the young men of that rising nation. Dr. Busse is now Privatdocent of Philosophy in Marburg, Germany. The three teachers whom he cites as his masters, and as having furnished the stimulus to his thought, are Lotze, Kant, and Hume; but he has borrowed nothing from these men, he claims, that he has not made thoroughly his own, so that his philosophy is entitled to independent rank.

Dr. Busse aims to find some tenable position, in the struggle now waging between dogmatic philosophy and the critical theories of knowledge respecting the possibility of metaphysics. Man is a dogmatist, he contends, by birth and nature. The ingenuous clown sees and thinks the world as it appears to him, and no scepticism can dissuade him from his convictions. Even the doubt of the philosopher is based upon the ineradicable dogmatic prejudice that his doubting thought is true. If my doubt, as Descartes said, like my thought, proves my existence, it also proves the validity of my thought, for that is always assumed in the doubt. Now, belief in the objective validity of necessary thought is the assumption on which all metaphysics rests, and the point at which it is attacked by its opponents. And since that very belief and confidence in reason lies also at the basis of the scepticism which the critics of knowledge offer, the attempt is naturally in order, to investigate the position of these opponents of metaphysics, and to show to what extent they have made use of the very dogmatic and metaphysical prejudice which they combat. It may turn out, as Kant has said, that they never think but they lapse themselves into metaphysical affirmations.

This investigation forms the subject of the first part of Dr. Busse's book. His method is to analyse the assertions of the anti-metaphysicians, and to develop their consequences, so as to reach the final assumptions on which they rest. Those assumptions are then probed and their own dogmatic and metaphysical character laid bare. Thus he shows that the denial of the possibility of truth is itself a procedure which presupposes the truth and validity of the laws of thought and consequently nullifies its own results; in a word, the very attempt to establish scepticism nullifies scepticism. In a similar way he proceeds to consider idealism, subjectivism, phenomenalism, etc., as forms of modified or conditional scepticism. He then takes up the critical and transcendental philosophies. In all, he finds that the anti-metaphysical speculations are vitiated by the very notions and methods which they profess to reject. A criticism of reason by reason is impossible in the sense of determining the possibility of objective metaphysical knowledge. To prove metaphysics impossible is itself impossible. Reason is incompetent to criticise reason. Epistemology, as a theory of the nature and origin of knowledge and of its relations to its objects, but as *resting* on metaphysical knowledge, is a possible and important branch of philosophy; epistemology as a critical and *fundamental* science is impossible. Then follows a brief section directed against the theological objections to metaphysics; the dogmatic innate prejudice respecting the validity of reason for all reality needs no assistance nor criticism from theology.

The second part of the work is positive and is devoted to what might be called the "encyclopaedic" exposition of the author's philosophy. It gives the outlines of his philosophical system as it takes form under his fundamental assumption of the objective validity of necessary thought, which is shown to be not equivalent to the speculative construction of all reality from pure reason, but admits other independent sources which although not affecting the validity of reason, nevertheless share

with it some of its prerogatives. First, the fundamental constituent elements of reality are ascertained. These are "principles," "facts," and "values," which cannot be expressed one in terms of another. Secondly, philosophy, as universal science, or world-wisdom, is divided into theoretical philosophy, which determines the nature of existence, into practical philosophy which investigates the so-called "values," and into religious philosophy which unites the results of both in the Absolute. This division is made on the ground of Kant's simple formulation of philosophy as consisting of the answers to three questions: "What can I know? What shall I do? What may I hope for?" Here all the questions are discussed that are usually classified under these three heads in the philosophical systems. The third part, which is not yet published, will go more into the details of the criticism of the traditional systems, which in this book is only indicated. μκρκ.

RICHARD AVENARIUS' BIOMECHANISCHE GRUNDLEGUNG DER NEUEN ALLGEMEINEN ERKENNTNISSTHEORIE, EINE EINFÜHRUNG IN DIE "KRITIK DER REINEN ERFAHRUNG." By Friedrich Carstanjen. München: Theodor Ackermann. 1894. Pp., 129. Price, M. 3.

According to Mr. Carstanjen, the *Kritik der reinen Erfahrung* of Prof. R. Avenarius marks a crisis in modern philosophical thought, being unique in all epistemological literature. That work consists of two parts: a biological part and a psychological part. In the first, a biomechanics is developed in which the process of cognition is reduced *in toto* to biological phenomena, being a complete doctrine of the changes and groups of changes of the central nervous organ according to purely logical points of view and wholly apart from the assumption of "psychical factors" of any sort whatever. Part II. is psychological, being devoted to the description and classification of the *Aussagewerte*, or predications of the individual as having psychical value. Rising from a broad physiological and anthropological basis a rigid parallelism is established between the changes of the central organ and the contents of the predications, both of which, member for member, are linked together like functions in mathematics are, or rather like the functions of a symbolical logic. The reading of Avenarius's works is a difficult task. His pages bristle with hybrid formulæ and imitations of mathematical nomenclature; and although the time, it seems to us, has not yet come for his commentators, it is perhaps well, just owing to this strange and forbidding physiognomy of his work, that some one should assist the timid student to approach him with confidence and hope. For one of the profoundest thinkers of our era Avenarius is; and tackle him we must, whether at first hand and originally in his own works or through Mr. Carstanjen's Introduction. At any rate, to supply the place of the *magnum opus* itself is not Mr. Carstanjen's intention. That, he says, must be studied by itself; *worked through*, pen in hand, not read through. All Mr. Carstanjen has sought to do is to give his own impression, as a sort of self-satisfaction, hoping that the fruits of his arduous labors will help others. The *résumé* seems to be a trustworthy one. μ.

THE MĀNDŪKYOPANISHAD. With Gaudapāda's Kārikās and the Bhāshya of S'ankara. Translated into English by *Manilal N. Dvivedi*. Bombay: Tookaram Tatya. 1894. Pp. 188. Price, one and one-half rupee.

Mr. Dvivedi is a well known and acute Hindu writer on philosophy. The present translation of the *Māndūkya* with its several commentaries, was undertaken by him at the request of Col. H. S. Olcott and in behalf of the Bombay Theosophical Publication Fund, generously donated by Mr. Iyer of the Madras High Court. So far as the translator knows the Bhāshya of S'ankara and the Kārikās of Gaudapāda are not yet rendered into English, and he is satisfied that the *Māndūkya* itself will be much better understood in the light of those commentaries,—a belief to which the student of the subject will no doubt yield his assent. Mr. Dvivedi has prefixed to the translation an excellent historical and expository introduction of fifty pages, giving a brief *résumé* of the doctrines of the six well-known schools of Indian philosophy with their various tendencies, but chiefly expounding the Advaita system, or philosophy of the absolute. Mr. Dvivedi is a zealous champion of the Advaita<sup>1</sup> system and knows how to connect its formal teachings with all the grave questions of modern society. With regard to the idea of publishing in English translations the records of the acute ancient Indian schools of thought, all scholars will be of the same opinion with Mr. Dvivedi that "it will be proved ere long that the generous gentleman who conceived the idea of accomplishing this work has rendered valuable service to the cause of literature and philosophy in general."

We have also just received a little pamphlet by this author on the Purānas, being a lecture delivered at the International Congress of Orientalists held in Stockholm in 1889. (Leyden: E. J. Brill.)

ALLGEMEINE PHYSIOLOGIE. Ein Grundriss der Lehre vom Leben. By *Dr. Max Verworn*, Privatdocent der Physiologie an der medicinischen Facultät der Universität Jena. Jena: G. Fischer. 1895. Pages, 584. Price, 15 M.

"The elementary constituent of *all* living substance and the substratum of *all* elementary phenomena of life is the cell. If, therefore, physiology finds in the "explanation of vital phenomena its fundamental task, it is plain that *general* physiology can only be a cellular physiology." Such is the thesis which Professor Verworn has placed at the foundation of his exhaustive treatise of *General Physiology*. A cursory glance at its contents will give us the best idea of its import and scope. First, we have a discussion of the aims and methods of physiological research, including a statement of the problem of physiology, the history of its development from ancient times, and a description of modern methods and theories. We shall only stop here to note (1) that Verworn's solution of the problem of body and soul, objectivity and subjectivity, consists in the simple assumption of a *psyche*, of which objects are mere groups of sensations; and (2) that there is no one exclusive

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<sup>1</sup>Advaita (literally "non-duality") is what we call *Monism*.

physiological method, but that *all* methods are admissible, provided they lead to the *one* physiological goal—the elucidation of life. The second chapter treats of the chemical and physical composition of living substance,—giving the elements of its morphology,—and of life and death; the third of the elementary phenomena of life, metabolism, cellular development, and the vital forms of energy; the fourth of the present and past conditions of life, biogenesis, and the history of death; the fifth of cellular irritation; the sixth and last of the physical machinery of life, cellular mechanics, and the economy of cellular states. The book is a portly one, richly illustrated (268 cuts), and contains full and adequate descriptions of the newest laboratory appliances.

As will be seen, the plan of the work leaves nothing to be desired, in everything that goes to constitute a historical and systematic presentation of the rudiments of general physiology. Much of the material is gathered from scattered and mostly inaccessible sources, and all is subjected to examination under new synthetic points of view. Stress is laid upon the importance of the comparative method as employed by Johannes Müller, to whose memory the work is dedicated. As the task here undertaken has never been attempted before on so extensive a scale and as an organic whole, the author asks his colleagues' forbearance and solicits from them rigorous and outspoken criticism. That criticism, however, is not for us. Professor Verworn's work supplies a profound want in the general literature of this subject, and will be of valuable assistance, by its easy style, not only to students and professors of physiology, but also to the cultured reader and scientist generally, be he philosopher or physician, botanist, zoölogist, or what not. It remains to state that Professor Verworn contributed an article to *The Monist*, somewhat over a year ago (April, 1894), on "Modern Physiology," which he has incorporated in the present work, and to which the reader may be referred for a succinct statement of his views.

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A HISTORY OF MATHEMATICS. By *Florian Cajori, Ph. D.* New York and London: Macmillan & Co. 1895. Pages, 422. Price, \$3.50.

There is no subject with which history as a rule is so little associated, nor any which in some of its parts derives so much profit from it, as mathematics. The history, for example, of the origin and growth of the calculus of variations is imperatively necessary to a profound apprehension of its principles. The chief function, however, of the history of mathematics, as a constituent of instruction, or collateral reading, is the stimulus which flows from the human and romantic features that adhere in such variety and number to the development of the science, as also the heuristic glimpses which it affords of the way in which knowledge generally is constituted. Intellectually nothing could be more refreshing than the anecdotes which De Morgan, say, recounts in his mathematical biographies of the wit and idiosyncrasies of the giants of mathematical thought, and physically, no doubt, many a lean-faced pangeometric youth will be spurred on to wholesome athletic efforts by

the story of the thirteen duels which John Bolyai accepted, fought, and won successively with the mere interlude of a violin-solo. On the other hand, although neither our use nor our understanding of logarithms is helped by the knowledge that Napier conceived the idea of them before exponents were used, and developed them wholly from geometrical and fluxional considerations, yet as an indication of the way in which science has grown up, nothing could be more instructive.

On the first of these points Professor Cajori lays some stress, not omitting to emphasise also the importance of the history of mathematics as a repository of the errors of the past, which if known can be avoided.

Professor Cajori's book is, as he calls it, a *brief general history of mathematics*. One must not expect to find in it a new treatment nor the embodiment of new views regarding the theory or the mode of development of knowledge. He relies, on this score, and especially in the earlier parts of the work, on the books and opinions of other investigators rather than on the subject-matter itself, and in some instances is uncritical on the philosophical side of the questions. For example, on that old *crux*, Why the Greeks made no progress in Mechanics, Physics, etc., he cites Whewell's theory that it was due to their not having "distinct and appropriate ideas"; which, since that is the very problem, is not calculated to throw much light on the ancient stagnancy in science. Perhaps, also, more references to the literature which contests the philosophical foundations of the Gauss and Riemann mathematical metaphysics might be given, for nothing, perhaps, needs more the curb of philosophical criticism than just this branch of speculation. But a small book cannot be an encyclopædia of the formal sciences, and our remarks, far from aspersing the character and merit of Professor Cajori's work, will go merely to show its scope and purpose. Its style is vivid and terse, and in mechanical execution and arrangement of matter the book attains a high standard. Undoubtedly, as a manual and handy book of reference it will fulfil an important office. More especially is this true of the chapter entitled "Recent Times," where, in contradistinction to the early history, much valuable information has been brought together which could hardly be found elsewhere in so compact a form, if at all, in any one book. This is its really valuable feature. It remains to be added, and as forcibly as possible, that for a book designed "to be acceptable to teachers and students" the price is much too high, and that apparently without justification.

T. J. McCORMACK.

PSYCHOLOGY FOR TEACHERS. By C. Lloyd Morgan, Principal of University College, Bristol. London: Edward Arnold. Pages, 251. Price, 3s. 6d. net.

The greater part of the fundamental doctrines of this latest book of Professor Morgan's are contained in his *Introduction to Comparative Psychology*, reviewed by us in the last *Monist*; and all the excellent qualities of lucidity and animation which marked that work are again displayed here. The book is designed for teachers and aims to show, by a running exposition of the salient points of psychology, how the practical problems of education can be elucidated and furthered by attention to the

results of scientific analysis. The charm of the book lies in the fluency and vivacity of the author's style, as in the breadth and naturalness of his interests. What is offered us are not vague generalisations, but doctrines and facts which appeal to our familiar and best experience. The ten chapters which constitute the book are entitled as follows: States of Consciousness, Association, Experience, Perception, Analysis and Generalisation, Description and Explanation, Mental Development, Language and Thought, Literature, Character and Conduct. Skillful is Professor Morgan's use in these expositions of the idea of a "focus" and "margin" of consciousness, and of the idea of a "mental background." The chapter on literature is admirable, and itself a striking witness of that union of scientific grasp with literary appreciation which the author commends. This book is by long odds the best popular work for persons beginning the subject of pedagogy which we know of, and one which certainly no practical teacher can afford to leave unread. It constituted originally a course of lectures delivered in Edinburgh in connexion with the Summer School of Art and Science, and it should also be mentioned perhaps that Dr. J. G. Fitch, late one of Her Majesty's Chief Inspectors of Training Colleges, has supplied to the book a commendatory preface.

T. J. McC.

LECTURES ON HUMAN AND ANIMAL PSYCHOLOGY. By *Wilhelm Wundt*. Translated from the Second German Edition by *J. E. Creighton* and *E. B. Titchener*. London: Swan Sonnenschein & Co. New York: Macmillan & Co. 1894. Pages, 454. Price, \$4.00.

The work from which this translation has been made is the revised and enlarged edition (1892) of Wundt's early popular lectures on psychology, published when the science was merely a "programme for the future" (1862) and necessarily in a very incomplete condition. The present volume, which is substantially a new and modern work, will serve a good purpose in instruction, as an intermediate reading between the first elements and the more technical treatises. The translators, who are two assistant professors in the University of Cornell, have acquitted themselves creditably of their arduous task, and it is to be hoped that their success and experience will encourage them to undertake the translation of Wundt's larger work—than which they could render the world no greater service. A superficial glance shows a few oversights in the book. The velocity of light is given (p. 92) as "42,100 miles" in a second, where *German* miles not English miles are meant. Also (p. 93) the ambiguous term "billions" might have been replaced by "millions of millions," or by figures. On p. 1 and elsewhere "natural philosophy," which in English commonly means "physics," and not "philosophy of nature" in the German sense, hardly gives the right contrast to "natural science." As regards the typography, it was certainly ill-advised to retain the cuts with the German color-designations, when they might have been replaced at a very small cost. The work should also have had an index.

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STUDIES FROM THE YALE PSYCHOLOGICAL LABORATORY. Edited by *Edward W. Scripture, Ph. D.*, Instructor in Experimental Psychology, Yale University, New Haven, Conn. Pages, 124. Price, \$1.00.

The "studies" of this little volume constitute the second year's work of the Yale Psychological Laboratory. They are chiefly by Mr. Scripture, the contents being as follows: On mean values for direct measurements, by E. W. Scripture; Researches on the mental and physical development of school-children, by J. Allen Gilbert; Remarks on Dr. Gilbert's article, by E. W. Scripture; Experiments on the highest audible tone, by E. W. Scripture and H. F. Smith; On the education of muscular control and power, by E. W. Scripture, T. L. Smith, and E. M. Brown; A psychological method of determining the blind-spot, by E. W. Scripture; Tests of mental ability as exhibited in fencing, by E. W. Scripture. Mr. Scripture's discussion of errors in measurement leaves nothing to be desired in point of mathematical ornamentation. He has submitted his conclusions to three mathematicians, each of whom dissents at some point from his deductions. He says, however, that any value this article may have "is due to their patient labor with one who is not a mathematician but who is obliged to use mathematical means to solve practical problems." Dr. Gilbert's researches on the development of school children present some interesting results, as do also "Tests of mental ability as exhibited in fencing." Mr. Scripture finds "that fencing does not develop mental quickness more than scientific pursuits, but it does develop to a high degree the rapidity of executing movements."

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SUBSTANCE AND ITS ATTRIBUTES. London: Kegan Paul, Trench, Trübner, & Co., Ltd. 1895. Pages, 197.

The task which the author of this anonymous work has assailed is by no means a puny one, although he has attempted it within a relatively modest compass. He has "eviscerated," he claims, the inherent attributes of primitive and essential substance, contending, properly enough, and not advancing the idea for the first time in the history of philosophy, that substance without attributes is a contradiction in terms. He has "defined," after his manner, the expressions "spirit" and "matter," tracing their consanguinity and connexion to what he takes to be their obvious natural source. He has also pointed out the "precise source and foundation of physical forces," and that, also, after a manner of his own. He has "manifested" the basis of life, "fairly analysed and formally promulged" the great law of causality, and discovered nothing less than a definite foundation for the ego or soul of man as essentially a spirit-entity. He has given "a fresh representation of the Absolute," which bears its *epitheton ornans* well, propounded a scheme of psychology, which he recommends for "its simplicity and harmony with facts," and, finally, he tells us it will be a sufficient reward and a cause of much rejoicing to him if he shall have contributed in the least by his book to throw down and destroy "one of the most complicated and most mischievous structures ever built up by the

"perverted ingenuity of man—the *a priori* schemes of Kantian and Hegelian transcendentalism," which he characterises as a terrible incubus that has too long enthralled philosophy. Add to this a batch of theological conceptions, which receive putative explanation here, and we shall have approximately the contents of this work. It is a mechanical ontology which has issued from the insight lately offered by science, that most physical phenomena can be represented as modifications of a hypothetical substance called the ether. The ether is the "Universal Substance which exists as an *ens* by itself, which is the absolute basis of all beinghood, which is uncreated, infinite, eternal, without parts, all-pervading, unseen, that cannot be displaced, and withal impersonal." As this ether can be anything and everything, the development of a full-fledged ontology from it and a consequent solution of all possible problems offers no material difficulties. But more significant than being just one of the thousand fanciful and possible developments of this insight, it is not.

T. J. McC.

MENTAL DEVELOPMENT IN THE CHILD AND THE RACE. Methods and Processes

By James Mark Baldwin, M. A., Ph. D., Stuart Professor of Psychology in Princeton University. With Seventeen Figures and Ten Tables. New York and London: Macmillan & Co. 1895. Pages, 496. Price, \$2.60.

"Every philosopher who becomes a father," said Max Müller once, "imagines himself *de ipso facto* in possession of the secrets of the origin of language and mind"—or, at least something to that effect. Professor Baldwin justly repudiates this disparaging insinuation, and with commendable heroism and an indomitable zeal for the truth accepts the derogatory epithet of "nursery psychologist" as a badge of honorable service and merit. None the less, Professor Baldwin is perfectly aware of the enormous difficulties and dangers which attend the investigations of this subject, which may be safely said to be still in its infancy. In fact, it is difficult to escape noticing here and there, a tinge of scepticism and despondency in the author's voice, as he lingers before that 'dark backward and abysm' of the early human mind—especially when he is confronted with the appalling diminutiveness of his predecessors' results. If such expressions escape him, however, they have purely a regulative function, and far from despairing of ultimate partial success—for otherwise he would not have written the book—Professor Baldwin is sanguine that rich and valuable results will be obtained, in fact has obtained them. When well into his own work, a cheerful optimism and confidence inspires him.

Professor Baldwin has opened up a new line of inquiry, and pursued it under a new method—"the dynamogenic method," which we shall speak of later. First as to the origin and contents of the book. Professor Baldwin began his work with simple observations on infants, which he published off and on in the scientific periodicals. On coming to the subject of child's imitations, however, especially in relation to volition, he was so deeply impressed with the *genetic* function of imitation as to feel compelled to entertain a widened view of the subject and to work out a theory of

mental development in the child on a new and considerably modified plan. That plan involved the consideration of a doctrine of the race-development of consciousness—the great problem of the evolution of mind. The first chapters, I-VI, are devoted to the statement of the genetic problem, with reports of the facts of infant life and the methods of investigating them, and also to what he calls the mere "teasing out" of the strings of law on which the facts are beaded—principles of suggestion, habit, accommodation, etc. Here the central problem of motor adaptation is considered. "Chapter V. gives a detailed analysis of one voluntary function, Handwriting. Then follows the theory of Adaptation, stated in general terms in Chapters VII. and VIII.; and afterwards comes a genetic view in detail (Chaps. IX. to XVI.) of the progress of mental development in its great stages, Memory, Association, Attention, Thought, Self-consciousness, Volition. So the whole is a whole, the theory resting upon an induction of facts (put before it) and supported by the deduction of facts (put after)." Professor Baldwin emphasises the bearing which his results will have on education and more especially on social or collective psychology, where the genetic theory will find "both its root and its ripe fruitage." He proposes, however, to take up this aspect in another work which shall bear the sub-title *Interpretations: Educational, Social, and Ethical*, in contrast to *Methods and Processes*, by which the present volume is described.

We may stop to note the author's philosophical position, which falls, he says, under the very indefinite category of "ethical or spiritual idealism." For example, concerning the explanation of consciousness or reason by evolution, the author takes the stand, now quite common among philosophers, "that the natural history question is not the same as the question of the essence or nature or explanation of mind. Philosophy has its problem just the same, however consciousness arose, and no amount of evolution theory can settle the problem set by philosophy." In fact, Professor Baldwin has serious doubts regarding the personal qualifications and even the good intentions of the biologists. "One almost despairs of them!" he says. And, again, regarding their puffed-up disinclination (for their hearts have been made fat and their ears heavy by the fulsome praises of the age), regarding their puffed-up disinclination to listen to "the plaintive note of one who but tries to interpret the wail of the human babe"—he slyly remarks: "But I am not prepared to dispute the point [the possibility of their listening] with any of my readers who find such an expectation quite too optimistic." All in all, the poor biologist comes in for some pretty hard hitting.

Respecting the advantages which Professor Baldwin cites as belonging to this subject: in the first place, infant psychology meets the urgent needs of mental analysis, in fact, is the only means of testing the truth of our mental analyses; we find in the child the elements of mind in the simplest human form. Again the phenomena of the infant consciousness are simple as opposed to reflective, and there is also a corresponding simplicity on the organic side. Lastly, in the list of advantages, a more direct application of the experimental method is possible in observing young

children. As to the dangers of abuse of infant psychology it is to be noted: (1) that "we can fix no absolute time in the history of the mind at which a certain mental function takes its rise"; (2) "that the possibility of the occurrence of a mental phenomenon must be distinguished from its necessity"; (3) "that it follows from the principle of growth itself only that the order of development of the mental functions is constant"; and (4) "that discrimination and criticism should be both strenuously cultivated and employed.

In the discussion of ontogenesis and phylogenesis, on the relation of which the motive idea of the book hinges, Professor Baldwin points out what he thinks is a "valuable distinction" for the interpretation of animal action. Taking the four stages of the child's experience of persons not himself; the objective, where the persons are merely sensations; the projective, where they are simply impersonated or individualised but not yet ensouled; the subjective, where he discovers himself; and the ejective, where he makes persons not himself *like* himself;—taking these four stages, he claims that no evident analogy in the animal series has been pointed out by other writers for what is here called the projective stage, but that such phenomena as the "gregarious instinct" cannot be accounted for except on the assumption of such an epoch of animal consciousness. By this distinction Professor Baldwin claims that he eliminates what is called the "psychologist's fallacy," habitual with naturalists.

As to the validity of the biological theory of recapitulation we are invited to note "very marked modifications of the race-record in the growth of the individual." "It is evident that while the organism develops serially in regular stages, yet often the stages in the individual's growth represent directly later stages in the series of animal structures, without having passed through all the earlier stages."

Finally, a word remains as to the author's new method. The methods heretofore employed have involved complex elements and roundabout paths of nervous transmission which greatly vitiate the results. Professor Baldwin has sought "to reach a method of child study of such a character as to yield a series of experiments whose results would be in terms of the most fundamental motor reactions of the infant, which could be easily and pleasantly conducted and which would be of wide application." The organ of reaction selected is the hand, which seems to be the most sensitive, direct, and active of all. He claims that "the infant's hand-movements in reaching and grasping are the best index of the kind and intensity of its sensory experiences." The dynamogenic method is the one which the author has preferred before all others in the experiments to which it is adapted, which he has developed as his own, and which has yielded him rich results. He has collected a list of his new observations in an appendix which shows at a glance their scope and thoroughness. The book is interspersed with much homiletic and educational matter, anecdotes of his children, etc., which relieve the monotony of the psychological development and enforce the author's theoretical positions. Professor Baldwin's book is written in a comparatively untechnical but withal precise style, and although

constituting one of the "sources" of the subject, it is by no means beyond the reach of the average educated reader.

T. J. McC.

GEHIRN UND SEELE. Ein Vortrag gehalten bei der 66. Versammlung deutscher Naturforscher und Aerzte in Wien am 26. September, 1894, von *August Forel*, Professor an der Universität Zürich. Bonn: Emil Strauss. 1894. Pp. 32. Price, M. 1.

The attitude of the myriad workers in the broad domain of modern knowledge, although professedly directed at a common goal, is mostly one of narrowness and hostility, due to mutual misunderstandings. The highest ideals of humanity as incorporated in philosophy, religion, science, ethics, and æsthetics, which are parts only of a harmonious whole, are rent with passions and prejudices, and appear to the dispassionate spectator as mere caricatures of their higher selves. It is to compose these misunderstandings, and to correct this disfigurement that Professor Forel has attempted in the above brief address to throw what light he can on one of the most significant and most knotty of ancient differences, the relation between the brain and the soul. His attempt is made in the form of a *résumé* of the most recent researches in cerebral and nervous physiology with the addition of philosophical criticisms based, mainly on the work of Kant and Spencer. He has taken a broad view of the questions and looked at them in their widest significance, making a strong appeal for the recognition and emphasis of their ethical and religious consequences. Especially does he insist upon the necessity of a philosophical elaboration of the results of science, claiming that such results have no significance except as related to the organic whole of knowledge. His reflexions show, he thinks, how intimately the study of the human cerebral soul is connected with all branches of human knowledge, and how eminently fitted it is to guard thinkers and inquirers against the dangers of narrowness and error. They lead, moreover, to a monistic view of the world capable of reconciling true religion and ethics with science, and constitute powerful weapons against the increasing social decadence of the age. The reputation of the author makes the recommendation of this brief pamphlet superfluous; it need only be said that students of all branches will find here important and suggestive hints on a variety of topics.

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WEGWEISER ZU EINER PSYCHOLOGIE DES GERUCHES. By *Dr. phil. Carl Max Giessler*. Hamburg and Leipsic: Leopold Voss. 1894. Pp., 79.

The author emphasises the difficulties which attend experiments with the organ of smell, which in its present neglected state does not seem very well fitted for the reception of delicate olfactory impressions. Disclaiming the intention of writing a complete psychology of smell, he discusses the effects of olfactory impressions upon the mental and physical life of individuals, showing that the psychical life of whole classes of lower orders of animals is bound up with their sense of smell, and that for the spiritual life of man the sense of smell is of an importance not to be under-

rated, as also that it exercises a great influence upon the mental development, being a factor hitherto much neglected. This is partly shown by the isolation which has been gradually effected, of all trades, professions, and duties from which disagreeable odors emanate. These considerations lead to a classification of smells, in this respect, as idealising and disidealising. Idealising smells are important factors in the development of the soul. The author finds a corroboration of his view in the biblical story of Creation, where God blew the breath of life into man's nostrils instead of into his mouth, *wherefore* man became a living soul. But on this point the author has evidently mistaken the connexion of the two facts.  $\mu$ .

**ÆSTHETIC PRINCIPLES.** By *Henry Rutgers Marshall, M.A.* New York and London: Macmillan & Co. 1895. Pages, 201. Price, \$1.25.

In his larger treatise, *Pain, Pleasure, and Æsthetics*, published a short time ago, Mr. Marshall gave the technical and psychological foundations of his new views on the theoretical principles of æsthetics. He has sought to put together now in this smaller work his more general and more interesting results and such as are of most *practical value* in reference to the study of æsthetics. It is written in a popular style and appeals to less critical and less learned readers. The book covers six chapters. In the first and second chapters the author studies the nature of æsthetic effect in the observer; in the third chapter, the nature of the impulse that compels the artist to undertake his work; in the fourth chapter, the nature of the critical act and of the standards used when we assume the critical attitude; in the fifth and sixth, algedonic æsthetics, including negative and positive principles. Mr. Marshall writes a plain and simple English and has mingled with his æsthetical expositions numerous moral and artistic reflexions of great value. His book deserves to find a wide circle of readers, and, harmoniously with its subject, has received a pretty and appropriate external dress. The substance of the work was delivered as a course of lectures under the auspices of the Trustees of Columbia College, New York.

T. J. McC.

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